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CONTENTS

<i>The Inaugural Address of the President of Harvard University:</i> DR. A. LAWRENCE LOWELL	497
<i>The Inaugural Address of the President of Dartmouth College:</i> DR. ERNEST FOX NICHOLS	505
<i>Dr. William Wightman</i>	516
<i>The Harpswell Laboratory</i>	517
<i>Honorary Doctorates Conferred by Harvard University</i>	518
<i>Scientific Notes and News</i>	519
<i>University and Educational News</i>	524
<i>Discussion and Correspondence:—</i>	
<i>Nature Study:</i> PROFESSOR ARTHUR GORDON WEBSTER. <i>Neon and Electric Waves:</i> PROFESSOR W. L. DUDLEY. <i>Fundulus Luciae in New Jersey:</i> HENRY W. FOWLER. <i>The Burden of Nomenclature:</i> JONATHAN DWIGHT, JR.	525
<i>Scientific Books:—</i>	
<i>A Half Century of Darwinism:</i> PRESIDENT DAVID STARR JORDAN. <i>The Fauna of Chile:</i> M. J. R.	527
<i>Note on the Occurrence of Human Remains in Californian Caves:</i> DR. JOHN C. MERRIAM	531
<i>Special Articles:—</i>	
<i>The Science of Exotic Music:</i> DR. BENJAMIN IVES GILMAN. <i>The Relationships of the Eskimos of East Greenland:</i> PROFESSOR FRANZ BOAS	532

INAUGURAL ADDRESS OF THE PRESIDENT OF HARVARD UNIVERSITY¹

AMONG his other wise sayings Aristotle remarked that man is by nature a social animal; and it is in order to develop his powers as a social being that American colleges exist. The object of the undergraduate department is not to produce hermits, each imprisoned in the cell of his own intellectual pursuits, but men fitted to take their places in the community and live in contact with their fellow men.

The college of the old type possessed a solidarity which enabled it to fulfil that purpose well enough in its time, although on a narrower scale and a lower plane than we aspire to at the present day. It was so small that the students were all well acquainted with one another, or at least with their classmates. They were constantly thrown together, in chapel, in the classroom, in the dining hall, in the college dormitories, in their simple forms of recreation, and they were constantly measuring themselves by one standard in their common occupations. The curriculum, consisting mainly of the classics, with a little mathematics, philosophy, and history, was the same for them all; designed, as it was, not only as a preparation for the professions of the ministry and the law, but also as the universal foundation of liberal education.

In the course of time these simple methods were outgrown. President Eliot pointed out with unanswerable force that the field of human knowledge had long

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been too vast for any man to compass; and that now subjects must be admitted to the scheme of instruction, which became thereby so large that no student could follow it all. Before the end of the nineteenth century this was generally recognized, and election in some form was introduced into all our colleges. But the new methods brought a divergence in the courses of study pursued by individual students, an intellectual isolation, which broke down the old solidarity. In the larger institutions the process has been hastened by the great increase in numbers, and in many cases by an abandonment of the policy of housing the bulk of the students in college dormitories; with the result that college life has shown a marked tendency to disintegrate, both intellectually and socially.

To that disintegration the overshadowing interests in athletic games appears to be partly due. I believe strongly in the physical and moral value of athletic sports, and of intercollegiate contests conducted in a spirit of generous rivalry; and I do not believe that their exaggerated prominence at the present day is to be attributed to a conviction on the part of the undergraduates, or of the public, that physical is more valuable than mental force. It is due rather to the fact that such contests offer to students the one common interest, the only striking occasion for a display of college solidarity.

If the changes wrought in the college have weakened the old solidarity and unity of aim, they have let in light and air. They have given us a freedom of movement needed for further progress. May we not say of the extreme elective system what Edmond Sherer said of democracy: that it is but one stage in an irresistible march toward an unknown goal. Progress means change, and every time of growth is a

transitional era; but in a peculiar degree the present state of the American college bears the marks of a period of transition. This is seen in the comparatively small estimation in which high proficiency in college studies is held, both by undergraduates and by the public at large; for if college education were closely adapted to the needs of the community, excellence of achievement therein ought to be generally recognized as of great value. The transitional nature of existing conditions is seen again in the absence, among instructors as well as students, of fixed principles by which the choice of courses of study ought to be guided. It is seen, more markedly still, in the lack of any accepted view of the ultimate object of a college education.

On this last subject the ears of the college world have of late been assailed by many discordant voices, all of them earnest, most of them well-informed, and speaking in every case with a tone of confidence in the possession of the true solution. One theory, often broached, under different forms, and more or less logically held, is that the main object of the college should be to prepare for the study of a definite profession, or the practise of a distinct occupation; and that the subjects pursued should, for the most part, be such as will furnish the knowledge immediately useful for that end. But if so, would it not be better to transfer all instruction of this kind to the professional schools, reducing the age of entrance thereto, and leaving the general studies for a college course of diminished length, or perhaps surrendering them altogether to the secondary schools? If we accept the professional object of college education, there is much to be said for a readjustment of that nature, because we all know the comparative disadvantage under which technical instruction is given in college, and we are not less aware of

the great difficulty of teaching cultural and vocational subjects at the same time. The logical result of the policy would be that of Germany, where the university is in effect a collection of professional schools, and the underlying general education is given in the gymnasium. Such a course has, indeed, been suggested, for it has been proposed to transfer so far as possible to the secondary schools the first two years of college instruction, and to make the essential work of the university professional in character. But that requires a far higher and better type of secondary school than we possess, or are likely to possess for many years. Moreover, excellent as the German system is for Germany, it is not wholly suited to our republic, which can not, in my opinion, afford to lose the substantial, if intangible, benefits the nation has derived from its colleges. Surely the college can give a freedom of thought, a breadth of outlook, a training for citizenship, which neither the secondary nor the professional school in this country can equal.

Even persons who do not share this view of a professional aim have often urged that in order to save college education in the conditions that confront us we must reduce its length. May we not feel that the most vital measure for saving the college is not to shorten its duration, but to insure that it shall be worth saving? Institutions are rarely murdered; they meet their end by suicide. They are not strangled by their natural environment while vigorous; they die because they have outlived their usefulness, or fail to do the work that the world wants done; and we are justified in believing that the college of the future has a great work to do for the American people.

If, then, the college is passing through a transitional period, and is not to be absorbed between the secondary school on the one side and the professional school on the

other, we must construct a new solidarity to replace that which is gone. The task before us is to frame a system which, without sacrificing individual variation too much, or neglecting the pursuit of different scholarly interests, shall produce an intellectual and social cohesion, at least among large groups of students, and points of contact among them all. This task is not confined to any one college, although more urgent in the case of those that have grown the largest and have been moving most rapidly. A number of colleges are feeling their way toward a more definite structure, and since the problem before them is in many cases essentially the same, it is fortunate that they are assisting one another by approaching it from somewhat different directions. What I have to say upon the subject here is, therefore, intended mainly for the conditions we are called upon to face at Harvard.

It is worth our while to consider the nature of an ideal college as an integral part of our university; ideal, not in the sense of something to be exactly reproduced, but of a type to which we should conform as closely as circumstances will permit. It would contemplate the highest development of the individual student—which involves the best equipment of the graduate. It would contemplate also the proper connection of the college with the professional schools; and it would adjust the relation of the students to one another. Let me take up these matters briefly in their order.

The individual student ought clearly to be developed so far as possible, both in his strong and in his weak points, for the college ought to produce, not defective specialists, but men intellectually well rounded, of wide sympathies and unfettered judgment. At the same time they ought to be trained to hard and accurate thought, and

this will not come merely by surveying the elementary principles of many subjects. It requires a mastery of something, acquired by continuous application. Every student ought to know in some subject what the ultimate sources of opinion are, and how they are handled by those who profess it. Only in this way is he likely to gain the solidity of thought that begets sound thinking. In short, he ought, so far as in him lies, to be both broad and profound.

In speaking of the training of the student, or the equipment of the graduate, we are prone to think of the knowledge acquired; but are we not inclined to lay too much stress upon knowledge alone? Taken by itself it is a part, and not the most vital part, of education. Surely the essence of a liberal education consists in an attitude of mind, a familiarity with methods of thought, an ability to use information rather than a memory stocked with facts, however valuable such a storehouse may be. In his farewell address to the alumni of Dartmouth, President Tucker remarked that "the college is in the educational system to represent the spirit of amateur scholarship. College students are amateurs, not professionals." Or, as President Hadley is fond of putting it: "The ideal college education seems to me to be one where a student learns things that he is not going to use in after life, by methods that he is going to use. The former element gives the breadth, the latter element gives the training."

But if this be true, no method of ascertaining truth, and therefore no department of human thought, ought to be wholly a sealed book to an educated man. It has been truly said that few men are capable of learning a new subject after the period of youth has passed, and hence the graduate ought to be so equipped that he can

grasp effectively any problem with which his duties or his interest may impel him to deal. An undergraduate, addicted mainly to the classics, recently spoke to his adviser in an apologetic tone of having elected a course in natural science, which he feared was narrowing. Such a state of mind is certainly deplorable, for in the present age some knowledge of the laws of nature is an essential part of the mental outfit which no cultivated man should lack. He need not know much, but he ought to know enough to learn more. To him the forces of nature ought not to be an occult mystery, but a chain of causes and effects with which, if not wholly familiar, he can at least claim acquaintance; and the same principle applies to every other leading branch of knowledge.

I speak of the equipment, rather than the education, of a college graduate, because, as we are often reminded, his education ought to cease only with his life, and hence his equipment ought to lay a strong foundation for that education. It ought to teach him what it means to master a subject, and it ought to enable him to seize and retain information of every kind from that unending stream that flows past every man who has the eyes to see it. Moreover, it ought to be such that he is capable of turning his mind effectively to direct preparation for his life work, whatever the profession or occupation he may select.

This brings us to the relation of the college to the professional school. If every college graduate ought to be equipped to enter any professional school, as the abiturient of a German gymnasium is qualified to study under any of the faculties of the university, then it would seem that the professional schools ought to be so ordered that they are adapted to receive him. But let us not be dogmatic in this

matter for it is one on which great divergence of opinion exists. The instructors in the various professional schools are by no means of one mind in regard to it, and their views are of course based largely upon experience. Our law school lays great stress upon native ability and scholarly aptitude, and comparatively little upon the particular branches of learning a student has pursued in college. Any young man who has brains and has learned to use them can master the law, whatever his intellectual interest may have been; and the same thing is true of the curriculum in the divinity school. Many professors of medicine, on the other hand, feel strongly that a student should enter their school with at least a rudimentary knowledge of those sciences, like chemistry, biology and physiology, which are interwoven with medical studies; and they appear to attach greater weight to this than to his natural capacity or general attainments. Now that we have established graduate schools of engineering and business administration, we must examine this question carefully in the immediate future. If the college courses are strictly untechnical, the requirement of a small number of electives in certain subjects, as a condition for entering a graduate professional school, is not inconsistent with a liberal education. But I will acknowledge a prejudice that for a man who is destined to reach the top of his profession a broad education, and a firm grasp of some subject lying outside of his vocation, is a vast advantage; and we must not forget that in substantially confining the professional schools at Harvard to college graduates we are aiming at the higher strata in the professions.

The last of the aspects under which I proposed to consider the college is that of the relation of undergraduates to one another; and first on the intellectual side.

We have heard much of the benefit obtained merely by breathing the college atmosphere, or rubbing against the college walls. I fear the walls about us have little of the virtue of Aladdin's lamp when rubbed. What we mean is that daily association with other young men whose minds are alert is in itself a large part of a liberal education. But to what extent do undergraduates talk over things intellectual, and especially matters brought before them by their courses of study? It is the ambition of every earnest teacher so to stimulate his pupils that they will discuss outside the class-room the problems he has presented to them. The students in the law school talk law interminably. They take a fierce pleasure in debating legal points in season and out. This is not wholly with a prospect of bread and butter in the years to come; nor because law is intrinsically more interesting than other things. Much must no doubt be ascribed to the skill of the faculty of the law school in awakening a keen competitive delight in solving legal problems; but there is also the vital fact that all these young men are tilling the same field. They have their stock of knowledge in common. Seeds cast by one of them fall into a congenial soil, and like dragon's teeth engender an immediate combat.

Now no sensible man would propose today to set up a fixed curriculum in order that all undergraduates might be joint tenants of the same scholastic property; but the intellectual estrangement need not be so wide as it is. There is no greater pleasure in mature life than hearing a specialist talk, if one has knowledge enough of the subject to understand him, and that is one of the things an educated man ought so far as possible to possess. Might there not be more points of intellectual contact among the undergraduates,

and might not considerable numbers of them have much in common?

A discussion of the ideal college training from these three different aspects, the highest development of the individual student, the proper relation of the college to the professional school, the relation of the students to one another, would appear to lead in each case to the same conclusion; that the best type of liberal education in our complex modern world aims at producing men who know a little of everything and something well. Nor, if this be taken in a rational, rather than an extreme, sense, is it impossible to achieve within the limits of college life? That a student of ability can learn one subject well is shown by the experience of Oxford and Cambridge. The educational problems arising from the extension of human knowledge are not confined to this country; and our institutions of higher learning were not the first to seek a solution for them in some form of election on the part of the student. It is almost exactly a hundred years ago that the English universities began to award honors upon examination in special subjects; for although the mathematical tripos at Cambridge was instituted sixty years earlier, the modern system of honor schools, which has stimulated a vast amount of competitive activity among undergraduates, may be said to date from the establishment of the examinations in *Literis Humanioribus* and in mathematics and physics at Oxford in 1807. The most popular of the subjects in which honors are awarded are not technical, that is, they are not intended primarily as part of a professional training; nor are they narrow in their scope; but they are in general confined to one field. In short they are designed to ensure that the candidate knows something well; that he has worked hard and intelligently on one subject until he has a substantial grounding in it.

For us this alone would not be enough, because our preparatory schools do not give the same training as the English, and because the whole structure of English society is very different from ours. American college students ought also to study a little of everything, for if not there is no certainty that they will be broadly cultivated, especially in view of the omnipresent impulse in the community driving them to devote their chief attention to the subjects bearing upon their future career. The wise policy for them would appear to be that of devoting a considerable portion of their time to some one subject, and taking in addition a number of general courses in wholly unrelated fields. But instruction that imparts a little knowledge of everything is more difficult to provide well than any other. To furnish it there ought to be in every considerable field a general course, designed to give to men who do not intend to pursue the subject farther a comprehension of its underlying principles or methods of thought; and this is by no means the same thing as an introductory course, although the two can often be effectively combined. A serious obstacle lies in the fact that many professors, who have reaped fame, prefer to teach advanced courses, and recoil from elementary instruction—an aversion inherited from the time when scholars of international reputation were called upon to waste their powers on the drudgery of drilling beginners. But while nothing can ever take the place of the great teacher, it is nevertheless true that almost any man possessed of the requisite knowledge can at least impart it to students who have already made notable progress in the subject; whereas effective instruction in fundamental principles requires men of mature mind who can see the forest over the tops of the trees. It demands unusual clearness of thought, force of statement and enthusiasm of expression. These qualities

have no necessary connection with creative imagination, but they are more common among men who have achieved some measure of success; and what is not less to the point, the students ascribe them more readily to a man whose position is recognized, than to a young instructor who has not yet won his spurs. Wherever possible, therefore, the general course ought to be under the charge of one of the leading men in the department, and his teaching ought to be supplemented by instruction, discussion and constant examination in smaller groups, conducted by younger men well equipped for their work. Such a policy brings the student, at the gateway of a subject, into contact with strong and ripe minds, while it saves the professor from needless drudgery. It has been pursued at Harvard for a number of years, but it can be carried out even more completely.

We have considered the intellectual relation of the students to one another and its bearing on the curriculum, but that is not the only side of college life. The social relations of the undergraduates among themselves are quite as important; and here again we may observe forces at work which tend to break up the old college solidarity. The boy comes here sometimes from a large school, with many friends, sometimes from a great distance almost alone. He is plunged at once into a life wholly strange to him, amid a crowd so large that he can not claim acquaintance with its members. Unless endowed with an uncommon temperament, he is liable to fall into a clique of associates with antecedents and characteristics similar to his own; or perhaps, if shy and unknown, he fails to make friends at all; and in either case he misses the broadening influence of contact with a great variety of other young men. Under such conditions the college itself comes short of its national mission of throwing together youths of

promise of every kind from every part of the country. It will, no doubt, be argued that a university must reflect the state of the world about it; and that the tendency of the time is toward specialization of functions, and social segregation on the basis of wealth. But this is not wholly true, because there is happily in the country a tendency also toward social solidarity and social service. A still more conclusive answer is that one object of a university is to counteract, rather than copy the defects in the civilization of the day. Would a prevalence of spoils, favoritism or corruption in the politics of the country be a reason for their adoption by universities?

A large college ought to give its students a wide horizon, and it fails therein unless it mixes them together so thoroughly that the friendships they form are based on natural affinities, rather than similarity of origin. Now these ties are formed most rapidly at the threshold of college life, and the set in which a man shall move is mainly determined in his freshman year. It is obviously desirable, therefore, that the freshmen should be thrown together more than they are now.

Moreover, the change from the life of school to that of college is too abrupt at the present day. Taken gradually, liberty is a powerful stimulant; but taken suddenly in large doses, it is liable to act as an intoxicant or an opiate. No doubt every boy ought to learn to paddle his own canoe; but we do not begin the process by tossing him into a canoe, and setting him adrift in deep water, with a caution that he would do well to look for the paddle. Many a well-intentioned youth comes to college, enjoys innocently enough the pleasures of freedom for a season, but released from the discipline to which he has been accustomed, and looking on the examinations as remote, falls into indolent habits. Presently he finds himself on probation for neglect of

his studies. He has become submerged, and has a hard, perhaps unsuccessful, struggle to get his head above water. Of late years we have improved the diligence of freshmen by frequent tests; but this alone is not enough. In his luminous Phi Beta Kappa oration, delivered here three months ago, President Wilson dwelt upon the chasm that has opened between college studies and college life. The instructors believe that the object of the college is study, many students fancy that it is mainly enjoyment, and the confusion of aims breeds irretrievable waste of opportunity. The undergraduate should be led to feel from the moment of his arrival that college life is a serious and many-sided thing, whereof mental discipline is a vital part.

It would seem that all these difficulties could be much lessened if the freshmen were brought together in a group of dormitories and dining halls, under the comradeship of older men, who appreciated the possibilities of college life, and took a keen interest in their work and their pleasures. Such a plan would enable us also to recruit our students younger, for the present age of entrance here appears to be due less to the difficulty of preparing for the examination earlier, than to the nature of the life the freshman leads. Complaints of the age of graduation cause a pressure to reduce the length of the college course, and with it the standard of the college degree. There would seem to be no intrinsic reason that our school boys should be more backward than those of other civilized countries, any more than that our undergraduates should esteem excellence in scholarship less highly than do the men in English universities.

The last point is one that requires a word of comment, because it touches the most painful defect in the American college at the present time. President Pritchett has declared that "it is a serious indictment of

the standards of any organization when the conditions within it are such that success in the things for which the organization stands no longer appeal effectively to the imaginations of those in it." We may add that, even in these days, indictment is sometimes followed by sentence and execution. No one will deny that in our colleges high scholarship is little admired now, either by the undergraduates or by the public. We do not make our students enjoy the sense of power that flows from mastery of a difficult subject, and on a higher plane we do not make them feel the romance of scholarly exploration. Every one follows the travels of a Columbus or a Livingston with a keen delight which researches in chemistry or biology rarely stir. The mass of mankind can, no doubt, comprehend more readily geographical than scientific discovery, but for the explorer himself it would be pitiful if the joy of the search depended on the number of spectators, rather than on zeal in his quest.

America has not yet contributed her share to scholarly creation, and the fault lies in part at the doors of our universities. They do not strive enough in the impressionable years of early manhood to stimulate intellectual appetite and ambition; nor do they foster productive scholarship enough among those members of their staffs who are capable thereof. Too often a professor of original power explains to docile pupils the process of mining intellectual gold, without seeking nuggets himself, or when found showing them to mankind. Productive scholarship is the shyest of all flowers. It cometh not with observation, and may not bloom even under the most careful nurture. American universities must do their utmost to cultivate it; by planting the best seed, letting the sun shine upon it, and taking care that in our land of rank growth it is not choked by the thorns of administrative routine.

If I have dwelt upon only a small part of the problems of the university; if I have said nothing of the professional and graduate schools, of the library, the observatory, the laboratories, the museums, the gardens, and the various forms of extension work, it is not because they are of less importance, but because the time is too short to take up more than two or three pressing questions of general interest. The university touches the community at many points, and as time goes on it ought to serve the public through ever increasing channels. But all its activities are more or less connected with, and most of them are based upon, the college. It is there that the character ought to be shaped, that aspirations ought to be formed, that citizens ought to be trained, and scholarly tastes implanted. If the mass of undergraduates could be brought to respect, nay, to admire, intellectual achievement on the part of their comrades, in at all the measure that they do athletic victory; if those among them of natural ability could be led to put forth their strength on the objects which the college is supposed to represent; the professional schools would find their tasks lightened, and their success enhanced. A greater solidarity in college, more earnestness of purpose and intellectual enthusiasm, would mean much for our nation. It is said that if the temperature of the ocean were raised the water would expand until the floods covered the dry land; and if we can increase the intellectual ambition of college students the whole face of our country will be changed. When the young men shall see visions the dreams of old men will come true.

INAUGURAL ADDRESS OF THE PRESIDENT
OF DARTMOUTH COLLEGE¹

THE past sixteen years have been and ever will be notable years in the history

¹ Given by Dr. Ernest Fox Nichols on October 14.

of Dartmouth College. In that time the number of students has all but quadrupled; and the material equipment of the college has expanded in proportion. The college has added to its libraries, built laboratories for its scientific departments and modern dormitories for its students. Its teaching staff has grown in size and advanced in quality. In every direction its growth has been rapid and great, but at the same time normal and balanced. The student body has changed in more ways than mere numbers, for if we believe with William Wyckham, "that manners maketh man" and to a very considerable extent they undoubtedly do, Dartmouth is not only graduating more, but a better average of men than in earlier times. Dartmouth's development in these years has been due in an extraordinary degree to the work of a single leader, and that leader is Doctor Tucker. His winning, alert and earnest personality, his wisdom, foresight and daring, his moral and physical energy, have carried the college forward over many obstacles which to others, at the time, seemed insuperable, and so they would have been under other leadership. The college has been truly blest with an intrepid and far-sighted pilot, who has brought her safely over rough seas and through some narrow and dangerous channels. The college, the state and the nation have just reason to take pride in Doctor Tucker's great achievement.

That grave problems still face the college is but evidence that Dartmouth is thoroughly alive, for in death only are all problems solved. It is not, however, of Dartmouth's individual problems that I wish to speak to-day—I am not yet sure I know them all. I want rather to speak of some of the problems common to all our American colleges, and ask per-

mission to speak of them not as an administrator, but as a college teacher—a calling in which I have some background of experience.

The college is the latest phase of the institutional life of our country to be assailed by the reformer, and it can not be denied that we have been unfortunate in some of those who have hurried in to tell us our faults. All angles of the complex problem are gradually coming into view, however, and the public once awake may be trusted to do its own thinking.

To open the whole subject in one address is manifestly impossible, yet there are some fundamental matters here which should be better understood. I shall speak briefly first of the place and intention of the college in our American education and later on certain aspects of the curriculum on undergraduate life and some of the problems of teaching.

The college rises on the finished foundations of the secondary school and leads to the professional and liberal departments of the university on the one hand and directly into the open fields and the branching highways of life on the other. It offers a quiet space for the broadening, deepening and enriching of the mind and soul of man, a home of mental industry and moral growth, a season for "the austere and serious girding of the loins of youth" and an inspiration to "that other life of refined pleasure and action in the open places of the world."

To those approaching graduate studies the college should offer those fundamental courses which serve as points of departure for the higher branches of theoretical and practical knowledge pursued in the university. To all it should give sound training in those analytical powers of reason upon which sane judgment must ever rely for its validity and it should

offer that knowledge of economic, social and political problems essential to enlightened and effective citizenship. The college should aid its students to understand what man is to-day by filling in the background, physical, mental and spiritual, out of which he has come in obedience to law. The whole current of college life should be so directed as to foster the finer qualities of mind and spirit which give men dignity, poise and that deeper sense of honorable and unselfish devotion to the great and common good.

Whatever knowledge and trained faculties a student may have acquired at graduation depend more upon the man and less upon the college. Colleges may provide the richest opportunities and the fullest incentive, but that which lies beyond is work the student must do in himself. College, like life, is whatever the man has industry, ability and insight to make of it. "They also serve who only stand and wait" was written to console blindness and advancing years, not as an apology for strength and youth.

THE CURRICULUM

To attack the curriculum seems to be an easy and rather stimulating task for most reformers, but to grasp its whole significance and deal fairly by it require more thought and pains than many a magazine or newspaper writer is accustomed to give to the things he so often whimsically approves or condemns. To understand the recent history of our colleges, from any point of view, the intellectual development of the world during the past half century must be taken into account as well as the rather lagging response which has come from school and church to its widening demands.

The middle of the last century saw the beginning of several intellectual move-

ments. Natural science got under way earliest by establishing the doctrines of evolution and energy. The bearing of these broad principles soon became as necessary to our modes of thought as they were immediately recognized to be for our material development. To-day there is no branch of knowledge which has not in some wise been extended and enriched by the philosophical bearing of these wide sweeping laws which, at first, were the individual property of natural science. So intimately have they become the guiding principles of all modern constructive thinking, that steer how he will the man in college can not escape their teachings. Although these principles are still most significantly presented in the laboratories in which they arose, the student will as surely find their progeny in philosophy and history, in theology and law.

The progress of half a century in the social sciences (history, economics, sociology, politics), has been of equal importance. Though no such fundamental and far reaching doctrines as those of evolution and energy have there been discovered, yet social studies have become vital to the interpretation and upbuilding of modern life and service.

What response did our colleges make to this revolution in thought, this sudden widening of intellectual and spiritual horizons, this modern renaissance? For a time practically none, for the curriculum was strongly entrenched in an ancient usage. Something called a "liberal education" was a kind of learned creed. The intellectual atmosphere outside the college grew broader, stronger, freer than in it. Forced by a rising tide, the colleges first made a few grudging and half-hearted concessions, but still held for the most part firmly to their creed. The defenders could always point in unanswerable argu-

ment to the men of profound and varied talents who have been trained under their discipline—a discipline which all must freely admit has never been excelled. But times had changed, professional schools and real universities had come into existence in America, and more kinds of preparation were demanded of the college. Modern life in its vastly increased complexity had outgrown the straitened mould of a pedagogical and clerical curriculum.

Finally in an awakened consciousness some colleges made the mistake inevitable after too long waiting, and not only established the newer subjects in numerous courses, but took the headlong plunge and landed in an unbridled elective system.

Under this unhappy system, or lack of system, for every student who gains a distinct advantage by its license several of his less purposeful companions seek and find a path of least resistance, enjoy comfort and ease in following it, and emerge at the other end, four years older, but no more capable of service than when they entered. Many another youth neither lazy nor idle, but lacking both rudder and chart, angles diligently in shallow waters, goes no deeper than the introductory course in any department, comes out with many topics for conversation, but no real mental discipline and but little power to think.

During the revolutionary period in our colleges, in which the newer studies took equal place along side the older ones, Dartmouth moved more circumspectly than some of her neighbors. In response to pressure from within and from without required courses were reduced in number and crowded back into freshman year. All other courses were grouped in logical sequences among which the student had for

every useful purpose all the freedom afforded by what I have called the unbridled elective system; but obstacles and hazards which required some serious thought and discipline to surmount were strewn in the path of least resistance. The incomplete angler also was compelled in some places to go deep enough to get the flavor of several branches of learning and acquire some sort of discipline.

Under this so-called group system, which has taken many forms in different colleges, our education is become liberal in fact as well as in name (the newer studies may be followed for their own sake as well as the older ones), and the college horizon has been vastly widened. The older and newer knowledges now stand on a footing of complete equality of opportunity, our education has caught up with the time and is in harmony with modern needs. Moreover the framework of the present curriculum is elastic enough to easily adapt itself to any changed conditions which may later arise.

In all this readjustment, many advocates of the classics have, it seems to me, been somewhat unduly alarmed and have lost sight for the moment of some of the sources of greatest strength in classical learning. They have emphasized the discipline of classical studies too much, and their charm too little. The undergraduate of to-day will not shirk disciplinary studies if he can be made to see definitely whither they lead and that the end be one which appeals to his understanding and tastes. He refuses to elect courses which are only disciplinary or are so represented.

The classics are as truly humane to-day as they ever were. Scientific studies have exalted observation and reason, we are gaining a sudden and surprising insight into nature and into social problems. We have grown in constructive imagination

and the power to think relentlessly straight forward, but the vision has been mainly external. Spiritual interpretations embodied in the nobler forms of artistic expression, in music, in poetry, in art, have not kept pace with our intellectual progress. It was in a genius for adequate, free and artistic expression, it was in imagination, in poetry, in consummate art and an exalted patriotism that the classic civilizations were strong. They had that in them to which man with a clearer insight and finer appreciation will one day gladly return. Their literatures give the fullest expression to the adolescence of the race, that golden time when men were boys grown tall, when life was plastic, had not yet hardened, nor men grown stern. Truth, beauty, goodness were still happily united; men did not seek them separately, nor follow one and slight the rest. Even philosophy with Plato was poetic in conception, and rarely smelt of the lamp.

Some of the deepest experiences of the race can not be justly characterized as either true or false because they have no place in the logical categories, hence unfeeling reason can not wholly find them out nor utterly destroy them. Much confusion and harm have come to man's most vital concerns through loss of balance and failure to recognize limits to pure reason as we now know it. Many a soul has been beaten back or shrunk by rejecting all impulses which could not be explained or fitted into some partial scheme of things. In this both science and theology, in different ways, have at times offended. Both with an assumed authority have marred the spirit by attempting to crowd it into the frame of a procrustean logic or to square it with a too rigid dogma. That this was neither true science nor good theology is now becoming clear, bound-

aries are shifting and the thought of man is moving forward toward the freedom of his birthright. No education which does not arouse some subtler promptings, vague aspirations—"Thoughts hardly to be packed into a narrow act, fancies that break through language and escape"—can rightly interpret the real and deeper sources of human action and progress. Our present emphasis is warped and partial, education should be an epitome of the whole of life, not of a part of it.

The tendencies of our college life, whatever some may say, are neither irreligious nor immoral, but quite the contrary. Religion is a side of the student which the present formal curriculum does not touch directly, hence for completeness' sake, some broad and effective religious teaching should be provided. Yet just how can such instruction be given in a way to hit the mark and not invade an instinctive sense of individual privilege? There is no realm of teaching which is more intimately personal and private than that which deals with religious convictions, and nowhere is the likelihood of good and ill result more dishearteningly tangled. Certainly such instruction in college could not be in the slightest degree dogmatic, and any special pleading would as surely defeat the intention. If courses broadly cast could be offered, in which the simple purpose was an impartial and sympathetic enquiry into the highest teachings of the several great religions with emphasis laid on the ethical and social import of various beliefs, Christian doctrine would inevitably rest on a broader foundation and be seen plainly of all men to justify its place in history. It is in a comparative study of religious teachings that I firmly believe Christianity will soonest achieve its rightful and vital supremacy in the minds of college men. Such studies can but add fresh reasons for our faith.

As our colleges give courses in the classics and esthetics, so they offer ethical courses, and some add a course in the philosophy of religion to their program of studies. Yet for some reason, possibly because the instruction is not simple and concrete enough, possibly the human side is treated too contemptuously, whatever the reason may be, courses in morality and religion are not now fulfilling their purpose because too few students elect them. To make such courses compulsory would be instantly to defeat their high purpose, and yet, somehow, the appeal of the college must be made to transcend the too narrowly intellectual side of man. Esthetics, ethics and religion are supremely rich in human interest; surely then courses of increased attractiveness somehow can be fashioned which students will more freely choose to their larger growth and lasting benefit. When this is done, and then only, shall we enlighten the whole man. His heritage in the deeper life will then no longer be left wholly to "time and chance which happeneth to them all."

Before entering upon a discussion of that most interesting and many sided person, the undergraduate, may I in behalf of true science, in which I am deeply interested, add a warning? Scientific studies just now are beset with some of the dangers of an unenlightened popularity. The public has lately taken a wide but too often untutored interest in natural science. A just appreciation of the enormous difficulties which fundamental investigation encounters is rare, and the limitations of our present methods of analysis are little understood outside the walls of the research laboratory and the mathematician's study. The blazonings of the latest scientific achievements in newspaper and magazine, too frequently immature and incorrect, with emphasis all awry, are building up a quite unreasoning expectation in the

minds of credulous readers. The study of science may do for the student other and better things than those he anticipates, yet many will be inevitably disappointed at the problems which the study of science will not solve. Enthusiastic parents, heedless of taste and fitness, too often urge their sons into scientific pursuits, not realizing that lack of intellectual preference in a boy is inadequate proof that he possesses that balanced mind which scientific investigation requires, and unusual pleasure at riding in an electric car is insufficient evidence of a marked capacity for the broader problems of electrical engineering. May not science be spared by some of her too enthusiastic publishers and over credulous admirers, who urge popular and sensational courses in science in place of the fundamental instruction now given? How much longer must newspapers and magazines give money and valuable space for worse than useless matter only because it masquerades in the garb of science?

UNDERGRADUATE LIFE

From every point of view the undergraduate is the central figure of the college. Clever or dull, industrious or lazy, serious or trifling, he is the only apology the college has to offer for its life. Him our restless critics would give no peace and he takes a gentle vengeance upon his accusers by being unconscious of them. All their thrusts are lost on him, at whose shortcomings they are mainly directed, for the real miscreant rarely reads.

The reformer's indictment is much too long to discuss here in detail, but he has discovered, for instance, that the average young man in college does not care enough for knowledge to pay proper attention to his studies. But this is not new, the average student never has. Again he finds that too many young men in college drift

into a life of ease and indolence. But this is as true out of college as in, and worse, it is a failing by no means confined to the young. To the stress of modern athletics, he claims the average student contributes not his muscle but only a voice. Yet in the earlier days before athletics, which a few of us remember, some men in college were even voiceless. A very slow growth, well rooted in a time-honored past, of indifference to scholarship on the part of some students seems to him a deadly fungus which has sprung up over night, an evil which requires some immediate and drastic remedy if the college is to survive, and he chafes at our tolerance and slowness to act.

An unhappy requisite for any thoroughgoing dissection is that death must precede it. Thus many a recent thrust at the college is directed at conditions belonging to a past existence. An even greater weakness of the critical faculty, in our day, is an intemperance which loses all sense of proportion and puts things too strongly—a weakness into which even those in the highest places have sometimes fallen. Thus evils which occur in the few receive a stress and lack of measure which seem to attach them to the many. In the practise of the newer criticism “the exception proves the rule” in an unfamiliar sense.

What class of students in college, it may reasonably be asked, cause us most concern? Certainly not the capable and energetic men who earnestly seek knowledge. Such do not even require very skilful teachers in the pedagogical sense, for given the necessary facilities they teach themselves most things. Some guidance from scholarly men they need, and little else. The dull but hard working student, though less independent, knows quite well how to care for himself and becomes educated in doing so. The real difficulty comes with

the indifferent, idle, ambitionless man who often, by reason of native capacity or sound early training, easily makes the passing mark which technically puts him beyond the reach of formal discipline and he tempts envious chance no further. This man is no stranger to us, he has always been in college, but we have come recently to take more notice of him. He oftener comes of well-to-do parents who also may look upon college as a polite formality in a young man's life. But too much emphasis must not be put on money, for the sons of the rich are not all idle nor, alas, are the sons of the poor always industrious. To take an extreme case, he is a man lacking in ideals, or equipped with an unprofitable set. He often comes to college avowedly despising books and their contents. He longs only to study men, to build those life-long friendships which brighten later years, and he too often hears much to encourage this attitude at home. How then does this youth go about so serious a business as the study of men? By closely observing the more earnest among his teachers and his fellow students who are using their college opportunities to fit themselves for life? No. But rather by seeking companions as passive as himself and drifting in the same sluggish current. I have no wish to give this wretched man more discussion than his flaccid and misguided purposes deserve, yet as critics have made much of him and greatly magnified his numbers, surely we should give his weakened state a thorough-going diagnosis that the treatment may be carefully chosen and salutary.

For this class of men home influence, or the lack of it, is more often to blame than the college. It is an open question whether the college has any obligation to help a small group of men who care so little to help themselves. In the English system the answer frankly given is that the college has

none. The pass and poll men of Oxford and Cambridge are present examples of a lifeless indifference to earnest scholarship in which the university has acquiesced. In England, however the indifferent are separated from the working students and are never a drag on their betters. In this country the numbers of this extreme type in most colleges are, as yet, small, but the range between it and the real student is long, and young men who are learning less than they might are scattered all the way between. The problem is not new, but it perplexes us and disturbs our counsels exceedingly. It is difficult to conduct a college which shall be at once an effective training school for studious men and an infirmary for the treatment of mental apathy. If it is our duty to keep such men in college, and many think it is, the problem presented is how to wake them up, and a pertinent question arises—are we at present organized to get at them by the only open door? Do we often enough get at the center of the man through his false ideals and the husks of his intellectual sloth? Can our teaching be made more direct and personal, not in a meddling way, but by methods vigorous and manly? In most colleges this problem has been complicated by numbers. The staff of teachers is not as large as it should be, and the human side of teaching, which requires the closest contact as well as breadth and sanity in the teacher, is in danger. That flint and steel contact between teacher and pupil, which many have reason to remember from the classrooms of their day, is now less frequent. The spark we have seen start mental fires in many an indifferent mind is struck less often. The hope of closer personal attention to students in college is in larger endowments which will sustain a more numerous teaching staff and permit classes to be further subdivided according

to scholarly ambition. This is a change which few colleges can now afford to make, for colleges must do with the means they have and keep within their incomes, if they can.

As to how this much discussed decline in scholarship, the real existence of which I seriously doubt, has come about, there are widely different opinions. In the first place, it may be justly questioned whether it is not apparent rather than real. The average student acquires more and wider knowledge in college now than he did thirty years ago. Outspoken scholarly enthusiasm rather than the getting of lessons seems to have suffered. Many students appear to have relaxed a little in the seriousness of purpose with which they approach their work. They certainly show more reserve in the way they speak of it. Here it must be remembered, however, that fashions the country over have changed and the expression of interest and enthusiasm in some subjects is more stintingly measured than a generation ago. If anything we now often get a scant portion in expression where we used to get an over-weight. Nowhere is this change more striking than in the gentle art of public speaking. Yet fashions react on men and our time may have lost something in forcefulness from its often assumed attitude of intellectual weariness, from a painstaking effort at restraint and simplicity of utterance. Our present tendency is to speak on the lighter aspects of even grave matters—possibly a kind of revolt against a flowery sentimentalism, an unctuous cant, or a long face. It is not considered in the best of taste just now to get into heated discussions and controversies over man's most vital intellectual and spiritual concerns.

The habit of suppression has come into the college from without. I do not think it began there. Science in the university may have misled the thoughtless to some extent

by an emotionless discussion of facts, but facts should be discussed without emotion; it is the lifeless statement of purpose from which we suffer. The driving power of intellect is enthusiasm, and there is no lack of it in that passionate devotion to research which so painstakingly and properly excludes all warmth from its calm statement of results. Yet it is nothing short of a divine zeal, an irresistible force, which urges the true investigator on to those great achievements, which are so profoundly changing the habits of our daily life and thought. For any mental indifference, therefore, be it real or assumed, science is in no wise responsible. Science takes herself very seriously and is always in deadly earnest.

In only one phase of college life to-day may a student, other than shamefacedly, show a full measure of pleasurable excitement, and that is in athletics. What might not happen to him who threw up his hat and cheered himself hoarse over a theorem of algebra, or over the scholarly achievements of the faculty! Some young men appear to have grown shy and to feel that a show of enthusiasm over ideas reveals either doubtful breeding, a lack of balance, or small experience with the world. They would be like Solomon in saying "there is no new thing under the sun," and profoundly unlike him in everything else—an easy apathy to things of the mind and spirit so often passes for poise and wisdom with the young! Thus some indifference in college and out of it is undoubtedly more assumed than genuine. But again we are in danger of utterance and manner reacting on thought and effort. Signs of such a reaction are already apparent. Thus the college atmosphere has seemingly lost, for the initially weak in character, some of its vigorous and wholesome mental incentive.

May we not henceforth live our college

life on a somewhat higher plane, where real simplicity, naturalness and downright sincerity replace all traces of sophistication and wrong ideals. Let genuine enthusiasm find freer and more fearless expression, that we may become more manly, strong and free. Why can't some college men stop masquerading in an assumed mental apathy and be spontaneously honest?

Some who have sought an explanation of this slightly altered tone in college life blame intercollegiate athletics for the changed conditions, but I am not able to find the cause there, and believe, as I have already suggested, that it lies far deeper in the changed conditions of society and our national life. The outcry to abolish intercollegiate sports is rather hard to explain. Aside from the assumed injury done to studious habits, apparently no one really objects to sports kept within bounds. But our colleges by agreement may set the bounds wherever they choose. Where, then, is the real reason for complaint? On the other hand, intercollegiate sports do more to unite the whole college and give it a sense of solidarity than any other undergraduate activity, and thus serve a worthy purpose. Moreover, the lessons of sport are lessons of life and it is the moral worth rather than the physical benefit of athletics which we can ill afford to lose from student life. They effectively teach a high degree of self control, concentrated attention, prompt and vigorous action, instant and unswerving obedience to orders, and a discipline in accepting without protest a close ruling, even if a wrong one, in the generous belief that he who made it acted in good faith. Sport, like faith, knows no court of appeal. A man's moral fiber comes out in his bearing toward his opponent in the stress of play and in the dignity with which he meets defeat or victory at the end of the game. By gallant conduct toward a victorious adversary a bodily defeat becomes a

personal triumph. It is only when the spirit is defeated through the body that upright men cry shame! I believe one of the severest tests of a gentleman to be his ability to take victory, or defeat, with equal good will and courtesy toward those against whom he has bodily contended. Whether we get all that we might out of our college sports is another question, but year by year we approach nearer and nearer to the higher standards of a true sportsmanship.

The problem of athletics suggests another problem which is its twin: What shall we do for the symmetrical development of those who do not train on college teams but who need physical training far more than athletes do? Here is a question which has not been successfully met and one which demands immediate and wider consideration than it has yet received.

To strengthen interest in scholarship by introducing a larger element of competition than at present is a suggestion which has come from several different sources recently. The competitive idea has long been in full force in the older English universities with what is now regarded there as a result to which good and evil have contributed nearly equal parts. Our own colleges have always offered some prizes for high scholarly attainment but the inspiration for a sufficient extension of the custom to make it a leading idea in our undergraduate life has been drawn from the extraordinary success of athletic contests in arousing student effort and enthusiasm. That a wider competition in scholarship than we now have would produce some useful results lies beyond question, but that those who expect most of all things from it will be disappointed may be confidently predicted. It seems to me that the larger part of the ardor students show for athletic contests is due more to the appeal which bodily combat always makes to the dramatic sense than to the competitive idea in

itself. It is the manly struggle more than the victory which men go out to see. I can not conceive how we are to clothe scholarship contests with a dramatic setting—as well attempt to stage the book of Job, aptly called “the drama of the inner life.” The drama of scholarship must ever be a drama of the inner life which will never draw a cheering multitude nor light bonfires. To call men to witness a contest in geometry is less strong in its appeal to human sympathies and interest than the bootless cries of Diogenes prostrated at the roadside, to those who passed on their way to the Olympic games. “Base souls,” he cried, “will ye not remain? To see the overthrow and combat of athletes how great a way ye journey to Olympia, and have ye no will to see a combat between a man and a fever?” Competition is a fundamental law of nature, and it may be a human instinct, but it never can be an ideal, for the virtue of an ideal is a willingness for self-sacrifice of some sort, while the virtue of competition is a willingness to sacrifice others. Competition, therefore, is not a moral force, and as a motive lacks the highest driving power.

Most that I have said of undergraduate life has been in analysis of its weakest members. The vast majority of college men are sound in mind and heart and purpose and no young men were ever worthier of admiration and respect than these. I have not dwelt upon them because their condition suggests no vexed pedagogical nor administrative problems. “They that be whole need not a physician, but they that are sick.”

THE TEACHER

As with the undergraduate, so with the faculty, many a reformer has singled out the weakest member and has seemingly affixed this label to all. But has he forgotten that there are mediocre lawyers,

physicians, preachers, engineers, business men, all making a living from their various occupations simply because there are not enough men of first-rate ability to supply the world's needs? Teaching can not stand alone but must share the lot of other professions. In a generation the monetary rewards in most occupations have advanced more rapidly than in teaching, where they never have been adequate, and colleges have felt a relative loss. In law, in engineering, in medicine, in business, the average rewards for corresponding successes are roughly double those in teaching. It is safe to say the colleges are getting far more out of their better teachers than they are paying for. Teaching is to many a very attractive career, not because of the leisure for idleness which it is supposed by some to offer but because of its possibilities of service to the wholesome life and highest welfare of society and the state. The teacher who takes his calling seriously and fulfils its high demands spends less time in idleness than his apparently more busy brethren in trade. That he must give many hours to wide-ranging thought and reflection has often misled the public into thinking him an idle dreamer. But dreaming and visions are a part of his business, though the dreamer to be worthy must dream straight and the vision must be clear. How much do we not owe to the dreamer, in science, in literature, in art, in religion, to say nothing of his part in those unthought of benefits, those subtler influences grown up in tradition, influences which have lost or never had a name, which yet continue to inspire and brighten all our days—visions seen by earlier men whose lives must have seemed idle enough to an auctioneer?

Judged by the higher standards, there are unquestionably a few uncertain and indifferent teachers in our colleges. There always have been. The proportion of men

of first-rate ability has improved, but there is need of further improvement. As soon as the public will give the colleges sufficient means to command the men they want, all cause for criticism will be removed.

We need special knowledge in college teachers, but not specialized men. Whatever the subject, it is the whole man that teaches. While being taught the undergraduate observes the teacher and takes his measure in several well-defined directions: the richness of his knowledge, his enthusiasm for learning, his way of putting things, his sense of humor and the range of his interests. He shrewdly guesses whether or not his instructor would be an agreeable companion, if all restraints were removed, and the subject of the day's lesson swept out of mind. The student frequently knows, too, whether or not his instructors are producing scholarly work which competent students elsewhere admire and respect. Nothing gives a teacher more authority and command over the imaginations of his students than a well-earned reputation for fundamental scholarship and research, and nothing so much stimulates the undergraduate's ambition for sound learning and intellectual achievement as sitting at the feet of a master who has traveled the road to discovery. Even as much as a virtuous example breeds virtue in others, so scholarly work breeds scholarship. Presidents and boards of trustees have not always seen the great advantage to a college of retaining a group of strong productive scholars with an instinct for teaching, on its faculty. All these elements enter into the unconscious respect the student feels for his instructor, and increase or lessen a teacher's influence and worth in the college. The driving of men through college is not as reputable as it used to be, and real intellectual and moral leadership in teaching is steadily taking its place. Students now largely choose

their courses and instructors, for varying reasons to be sure, but some of them are good. Student opinion freed from mixed motive and superficial judgment is usually wholesome and sound.

The college in all its relations is the most human and humanizing influence in all our civilization; and year by year its gains in this direction are substantial. Taking the good with the bad our colleges have never been as well organized and equipped as now, nor have they ever done their work more effectively than they are doing it to-day. Any dissatisfaction with college life does not find its basis in comparisons with earlier years, notwithstanding many find, in such comparisons, partial reason for complaint. We are not quite satisfied with the college, because it does not realize our later ideals of education, not because it falls short of our earlier ones. It is well to have ideals and to have them high, and it is a wholesome sign of intellectual vigor to be impatient at the long distance which separates the way things are done from the way we think they ought to be done. Beyond just measure, however, dissatisfaction paralyzes hopefulness and effort; we must keep clear of pessimism, if we are to go forward.

In twenty years of teaching and observation, I have become convinced of some things connected with teaching as a profession. No teacher can hope to inspire and lead young men to a level of aspiration above that on which he himself lives and does his work. Young men may reach higher levels but not by his aid. The man in whose mind truth has become formal and passive ought not to teach. What youth needs to see is knowledge in action, moving forward toward some worthy end. In nobody's mind should it be possible to confuse intellectual with ineffectual. Let it not be said:

We teach and teach
Until like drumming pedagogues we lose
The thought that what we teach has higher ends
Than being taught and learned.

It ought to be impossible, even in satire, to say "Those who can, do; those who can't, teach."

The strong teacher must ever have the best of the priest about him in the fervor of his faith in the healing power of truth. Let our teaching be sane, fearless and enthusiastic, and let us not, even in moments of despondency, forget the dignity, the opportunity, the power of our calling. The teacher is the foremost servant of society and the state, for he is moulding their future leaders. Sound learning, wisdom and morality are the foundation of all order and progress, and these it is the aim of the college to foster. If we can send into the world a yet larger number of strong young men—men clean in body, clean in mind and large of soul, men as capable of moral as of mental leadership, men with large thoughts beyond selfishness, ideas of leisure beyond idleness, men quick to see the difference between humor and coarseness in a jest—if we can ever and in increasing numbers send out young men of this sort, we need never fear the question—"Can a young man afford the four best years of his life to go to college?"

DR. WILLIAM WIGHTMAN

IN SCIENCE of June 4 last there appeared the following brief item:

"Dr. William Wightman, of the Public Health and Marine Hospital Service, died at Guayaquil, Ecuador, on May 17, from yellow fever."

As a rule, only the claim of conspicuous achievement can arrest any wide attention at the passing of a unit of the race; yet the circumstances of the life and death of William Wightman merit an attention wider than the circle of his acquaintances, and may offer

some inspiration for all who labor for the betterment of the race.

It is a subject of common, if rather vague, remark that America is beginning to exert a wider influence on the welfare of other peoples of the world, especially on that of our less favored sister nations of the same continent. This influence is constantly wielded through diplomatic efforts, through the labors of educational or religious bodies, through the movements of commercial expansion, but in no way more certainly and more beneficially than through the striking achievements and the example of our medical profession. The sanitary measures employed at Panama and extended to points of the west coast of South America for the better protection of the Canal Zone, have been of such evident advantage as to win a hearty recognition and an effort of cooperation from the South American countries. The indirect results in these countries will form a significant chapter in history, even though the names should be forgotten of those who labored at the beginning. Nevertheless, the foundation of an achievement of which the nation will be justly proud is laid by those who do the pioneer work under circumstances which demand not only a high degree of determination, but rare patience, tact and honor, or even an unassuming heroism. Of such pioneers was William Wightman, an American by adoption, by affection and by devoted service.

In the early part of 1906, as a young surgeon in the Public Health and Marine Hospital Service, who had served efficiently on our western coast, Dr. William Wightman was detailed to Callao, Peru, to act as quarantine agent attached to the American Consulate. For two years he served his country at this port, manifesting not only professional ability, but inflexible devotion to his duties, and unflinching courtesy and tact. It is not too much to say that he won the respect, and even the affectionate esteem, of most of those whose private interests suffered from the rigid measures of disinfection. Certainly he held a high place in the affection of the American and English residents and visitors of that region,

while he gained the confidence of the Peruvian surgeons and other officials with whom he was brought into contact. Undoubtedly, his presence, his sympathy and his counsel gave aid and inspiration to the native officers who labored for the cause of good health.

In the spring of 1908, when the government of Ecuador undertook the monumental task of eradicating the bubonic plague and yellow fever from its chief port, the city of Guayaquil, Dr. Lloyd, then in the quarantine service of our government at that city, was chosen by the Ecuadorian authorities to direct the difficult campaign of sanitation. This led to the removal of Wightman from Callao to Guayaquil to have charge of the important quarantine work at that place.

In Ecuador, even more than in Peru, Wightman was not content with the mere performance of official duties, but gave himself to professional service according as the need arose and so far as his limited spare time permitted, contending with the diseases of smallpox, bubonic plague and yellow fever. It was in such professional activity that he contracted the disease which so sadly terminated his short career.

There is no wish to attach an undue glamor of heroism to a simple and conscientious service. A principal charm and virtue of Wightman's was the mobility of his temperament, the ease with which he adapted himself to persons and conditions. While contributing to the health and pleasure of those about him, he found a sincere enjoyment, not only in his professional duties, but in the best society, native and foreign, that his surroundings afforded. There was no discontentment, no evident sacrifice. Only the closest friends could gain an intimation of the real sacrifice entailed by the enforced separation from a loved wife and child, whom he feared to take into an unhealthful climate, or by the exposure of a constitution of whose weakness he was aware to so prolonged a stay in a tropical region. It was these considerations, and chiefly the former, which made his transfer to Guayaquil a reluctant one, though accepted without complaint. The personal exposure to

infectious diseases was, of course, accepted unreservedly as the lot of his profession.

The sacrifice involved in such a case is the greater from the fact that our government, strangely, offers no assurance or hope of a just provision for the families of those who may risk and give their lives in such patriotic and humanitarian service.

A life devoted steadfastly to the country of his adoption, and finally sacrificed all too early by the voluntary extension of this service for the good of fellow men of another nationality—in this is an appeal to the pride of all Americans. A wide and sincere sympathy will be felt for the wife and child that are bereft.

We pride ourselves that the American flag goes out over the world as the emblem of peace, of health and of prosperity, but the men who most loyally carry it and who, unknowingly, add to its honor are such as William Wightman.

ROBERT E. COKER

THE HARPSWELL LABORATORY

THE Harpswell Laboratory at South Harpswell, Maine, was opened for the tenth season from June 10 to September 9, 1909, every room being occupied by investigators. No considerable changes have been made in the equipment, but the library has been increased, chiefly by gifts of separata from authors. Of these there are over 500 new titles, while friends kindly gave subscriptions to several American journals. To all these the thanks of the laboratory are due.

The following persons worked at the laboratory, most of them for the entire season:

George A. Bates, professor of histology, Tufts Medical School. Histology of the teeth.

Frank S. Collins, Malden, Mass. Studying the marine Algæ of Casco Bay.

Ulric Dahlgren, professor of biology, Princeton University. Comparative histology of various vertebrates and invertebrates.

Charles H. Danforth, instructor in anatomy, Washington University, St. Louis. Structure of the head in a recently hatched *Amiurus*.

Pauline H. Dederer, tutor in zoology, Barnard College. Pressure experiments on developing eggs of *Cerebratulus* and spermatogenesis in *Platysamia*.

C. W. Hargitt, professor of zoology, Syracuse University. Embryology of the cœlenterates.

George T. Hargitt. Embryology of *Clava* and *Aurelia*.

J. S. Kingsley, professor of biology, Tufts College. Comparative anatomy of vertebrates.

Frederic S. Lee, professor of physiology, Columbia University, and Max Morse, instructor in natural history, College of the City of New York. The phenomena of summation of stimuli in various invertebrates.

Charles S. Mead, instructor in zoology, Northwestern University. Structure of Verrill's "*Dinophilus simplex*."

T. H. Morgan, professor of zoology, Columbia University. The effects of centrifuging the eggs of *Cerebratulus*.

H. V. Neal, professor of biology, Knox College. The histogenesis of the eye muscle nerves in *Acanthias*.

Harley J. Van Cleave, graduate student in the University of Illinois. The cell lineage of *Cerebratulus*.

Leonard W. Williams, instructor in comparative anatomy, Harvard Medical School. The anatomy of *Myxine*.

During the summer seminars were held weekly, with extra meetings several times. At these times members of the laboratory and visitors presented the results of their recent work or made statements of the condition and progress of their special fields. Among these talks were the following:

Frank S. Collins: "Certain Problems in the Geographical Distribution of the Marine Algae."

Ulric Dahlgren: "The Development of the Electric Organs in the African Genus *Gymnotus*."

Bashford Dean: "The Embryology of the Lower Fishes and its Bearing on the Validity of the Biogenetic Law."

Herbert S. Jennings: "Recent Experiments on the Causes and Meanings of Conjugation in *Paramœcium*."

J. S. Kingsley: "Recent Evidence Bearing on the Origin of Mammals."

F. D. Lambert: "The Life History of an Undescribed Genus of Chlamydomonads."

Frederic S. Lee: "The Phenomena and Causes of Fatigue."

F. B. Loomis: "Fossil Hunting in Sioux County Nebraska."

C. S. Mead: "The Chondrocranium of the Pig."

Charles S. Minot: "Recent Researches on the Morphology of the Blood."

T. H. Morgan: "Heredity of Hair Color in White Mice."

Max Morse: "Rhythmical Pulsations in the Umbrella of *Aurelia* and *Cyanea*. The Determination of Sex."

Leonard W. Williams: "The Primitive Segmentation of the Mesoderm and the Origin of the Sclerotomes in the Chick."

Frederick A. Woods: "The Evidence Bearing on the Question of Modifications as the Results of External Conditions."

HONORARY DOCTORATES CONFERRED BY HARVARD UNIVERSITY

On the occasion of the inauguration of Dr. A. Lawrence Lowell as president of Harvard University, honorary degrees were conferred on thirty delegates. Those on whom the degree of doctor of science were conferred and the characterizations of President Lowell were as follows:

WILLIAM NAPIER SHAW, eminent in the new science of meteorology; welcome delegate from John Harvard's college, and from the ancient university whose sons bore the sacred fire of learning to a new England.

JOHN CHRISTOPHER WILLIS, also a delegate from the University of Cambridge; an eminent botanist, remarkable for his knowledge of tropical vegetation; director of the Royal Garden in Ceylon; who has done a great work in improving the varieties useful to men.

JOHN HARVARD BILES, delegate from the University of Glasgow; professor and master of naval architecture on the Clyde, where fleets are built that carry the commerce of the world.

HECTOR FREDERICK ESTRUP JUNGENSEN, delegate from the University of Copenhagen; professor of zoology and director of the Zoological Museum; heir of an ancient and virile race, who has enriched modern science by his profound studies of reproduction and development in fishes.

GEORGE ALEXANDER GIBSON, delegate from the University of Edinburgh; physician and professor of medicine; a clear and prolific writer; investigator of the action of the heart; distinguished teacher in a school long famous, where founders of our own medical school were trained more than a hundred years ago.

JACOBUS CORNELIUS KAPTEYN, director of the Observatory of Groningen; astronomer and organizer of scientific work; fit representative of a strong race, already glorious in arms, in art, in learning and in adventure.

WILLIAM ABBOTT HERDMAN, delegate from the University of Liverpool; a great authority on marine biology, who has dredged the floor of the ocean, and learned the secrets of the oyster and the pearl.

WILLIAM BERRYMAN SCOTT, a delegate from Princeton University; a persistent and thorough explorer of early mammal forms, he has helped to draw aside the veil that shrouds the mystery of life upon our planet.

ARTHUR AMOS NOYES, chemist of renown; a leader of research in physical chemistry. As professor at the Massachusetts Institute of Technology, and recently its head, our neighbor, our fellow-laborer, and our friend.

EDWARD BRADFORD TITCHENER, a delegate from Cornell; thorough and exact in methods of work in a new and rich field, his researches in experimental psychology have enlarged the bounds of human knowledge.

ELIHU THOMSON, delegate from the American Academy of Arts and Sciences; prolific in research and invention; a magician who by the witchcraft of science has subdued electricity to the service of man.

The degree of doctor of law was conferred on President Remsen with the following words:

IRA REMSEN, president of Johns Hopkins University; eminent for his researches in chemistry; a public-spirited citizen; and worthy to lead the university that first taught our country the higher training of scholars.

SCIENTIFIC NOTES AND NEWS

PROFESSOR GEORG LUNGE, the eminent chemist of Zurich, was presented on September 19 with a gold medal bearing his portrait and the sum of 40,000 francs to celebrate his seventieth birthday and the jubilee of his doctorate. Chemists were present from many countries and addresses were delivered by a number of delegates. Professor Lunge in his reply announced his intention of giving the money to the Polytechnic Institute for the aid of students of chemistry.

WE learn from *Nature* that in view of the retirement of Professor J. Cleland, F.R.S., from the chair of anatomy, and of Professor Jack from the chair of mathematics, at the end of the present month, there has been set

on foot, on the initiative of the business committee of the general council of the University of Glasgow, a movement for making appropriate recognition of their long and distinguished services. The form of recognition will, to a large extent, depend on the amounts subscribed, but it is thought that it might fitly include the provision of some fund for the advancement of anatomical and anthropological science in the case of Professor Cleland, and of mathematical science in the case of Professor Jack, and the presentation to the university of portraits or busts by an eminent artist.

DR. J. F. ANDERSON has been appointed director of the Hygienic Laboratory, Washington, D. C., to succeed Dr. M. J. Rosenau, who retires from the Public Health Service to accept a professorship of preventive medicine and hygiene at Harvard University. Dr. Anderson entered the Public Health Service in 1898 and for the past seven years has been assistant director of the laboratory. He has carried on his work on the standardization of diphtheria and tetanus antitoxins, market milks for tubercle bacilli and immunity and anaphylaxis. He is a graduate of the University of Virginia.

DR. KARL SCHWARZSCHILD, professor of astronomy at Göttingen, has been appointed director of the Astrophysical Observatory at Potsdam.

DR. O. L. ZUR STRASSEN, associate professor of zoology at Leipzig, has been appointed director of the Museum of the Senckenberg Natural History Society at Frankfurt.

TEMPORARY INDUSTRIAL FELLOWSHIP, No. 7, at the University of Kansas, concerning the relation of the optical properties of glass to its chemical constitution, has been awarded to E. Ward Tillotson, Ph.D., of Yale. Dr. Tillotson, while at Yale, held both the Loomis and the Silliman fellowships in chemistry.

WM. A. WITHERS, professor of chemistry in the North Carolina College of Agriculture and Mechanic Arts and chemist of the Experiment Station, was elected president of the Association of Official Agricultural Chemists at its

recent meeting in Denver, August 26 to 28, 1909.

SOME anxiety is caused by the failure to receive news from Professor C. K. Leith, of the University of Wisconsin, who, with Mr. Hugh M. Roberts and Mr. Francis S. Adams, has been making geological explorations in the neighborhood of Hudson Bay. No word has been received from them since their departure last June, and it is thought that they may be compelled to spend the winter in the north.

PROFESSOR A. S. HITCHCOCK, systematic agrostologist of the U. S. Department of Agriculture, has returned to Washington after four months spent in Alaska and the Yukon District studying the grasses of the region. The greater part of the work was done in the valley of the Yukon. Large collections representing the rich grass flora of the country were made for the National Herbarium.

MR. CARLOS GUERRERO, of the Argentine Republic, is visiting this country to study agricultural methods.

DR. JOHN C. WILLIS, director of the Royal Botanic Gardens of Ceylon, will give a course of four lectures on "Tropical Agriculture, with Special Reference to Economic Problems," at Harvard University, on October 12, 14, 16 and 19.

DR. W. B. CANNON, professor of physiology in the Harvard School, lectured before the Middletown Scientific Association on October 12, his subject being "Digestive Processes and the Influence of the Emotions upon Them."

DR. CHARLES R. BARNES, professor of plant physiology at the University of Chicago, lectures before the Geographical Society of Chicago on October 15, on "Mexican Plants and People."

THE subject of Professor Osler's address at the London School of Tropical Medicine, which is to be delivered on October 28, is "The Nation and the Tropics."

AT University College, London, public introductory lectures were given by Sir William Ramsay, on "Radium Emanation: one of the Argon Lines of Gases," and by Professor J. A.

Fleming, on "Electrical Inventions and the Training of Electrical Engineers."

WASHINGTON IRVING STRINGHAM, A.B. (Harvard '77), Ph.D. (Johns Hopkins '80), professor of mathematics in the University of California since 1882, appointed acting-president of the university during the president's leave of absence, died on October 5, at the age of fifty-two years.

LEONARD PEARSON, M.D., since 1891 professor of veterinary medicine in the University of Pennsylvania, and since 1897 dean of the veterinary school, known for his work on tuberculosis among cattle, died on September 20 at the age of forty-one years.

PROFESSOR ANTON DOHRN, whose death we were compelled to announce last week, died at Munich, on September 26. He was sixty-eight years of age. The funeral, after cremation, took place at Jena on October 3.

AT the meeting of the Chemists' Club, New York, held on October 8, it was announced that a Chemists' Building Company had been organized, for the purpose of acquiring a plot of ground, 56×100 , at 50 East 41st Street, and erecting thereon a large scientific building, the lower floors of which are to be rented to the Chemists' Club on a long lease, and contain scientific meeting rooms, a library and a museum, as well as the ordinary facilities required by a social organization, including sleeping apartments for its members. The upper floors of the building are to be rented for scientific laboratories for commercial and research work in chemistry and allied sciences. For the past eleven years the Chemists' Club has been located at 108 West 55th Street, and various chemical societies have used its meeting room, which has gradually proved inadequate to meet the growth of these organizations.

AT the closing meeting of the International Geodetic Association, held at Cambridge, there were made several announcements of scientific interest. According to the report in the London *Times* Lieutenant-Colonel Burard, representing India, said that recent levelling operations in India showed that the Siwalik range gained a few centimeters in

height in the great earthquake of 1905. Geologists believed that the whole mass of the Himalayas and Tibet was being pushed south and wrinkling up a new range out of the alluvial plain. The survey authorities had recently laid down six lines of bench marks which would be observed every ten years. Mr. B. F. E. Keeling, representing the Survey of Egypt, announced that the Egyptian government had recently purchased a platinum iridium standard from the same batch as the international meters, which would be the standard of length for Egypt; and that they hoped to begin gravity observations next spring with the pendulums belonging to the South Kensington Museum which Captain Scott took to the Antarctic. Mr. W. F. King, presenting the report from Canada, announced that his government had recently decided in favor of making the main triangulation of Canada not merely sufficient for topographical purposes, but of the highest possible accuracy, and that the department would henceforth be known as the Geodetic Survey of Canada. Mr. Nakano (Japan) described methods by which he had been successful in determining differences of longitude by the use of wireless telegraphy. Professor Foerster (Berlin) announced that the Bureau of Weights and Measures at Breteuil would shortly undertake a definite comparison between the stability of wires and of tapes of Suvar. M. Poincaré announced that arrangements had been made to send a signal each day at noon by wireless telegraphy from the Eiffel Tower. This signal will be available for shipping in the Atlantic and the Mediterranean, for the determination of longitude. Dr. Helmert (chief of the Central Bureau) announced the program of work of the Central Bureau for the next three years. It included further researches on the variation of latitude, deviations of the vertical along the 48th parallel, new reduction of the observations of gravity over the ocean, a general comparison of observations of latitude and deviation of vertical throughout the world, and a continuation of the observation of lunar earth tides. Sir George Darwin,

presenting the report of the Rigidity of the Earth Commission, asked the association to adopt a resolution approving of the grant of £100 annually to enable observations to be made by Dr. Hecher's method in the deep silver mines of Przbram, in Hungary, and asking the cooperation of the International Seismological Association.

HARLAN I. SMITH, of the department of anthropology of the American Museum of Natural History, has returned from a three months' trip along the northwest coast of America from Seattle to Skagway. He resumed his archeological reconnaissance of the coast, carrying it northward from Alert Bay near the northern end of Vancouver Island to a point on the Chilkat River, about twenty-five miles above Haines. The following sites were located: an ancient village site about four miles above the mouth of the Bella Coola River; shell heaps in the vicinity of Old Matlankatla and Prince Rupert, and both north and south of Port Simpson; a village site at the old eulichon fishing ground on the north side of Nass River a few miles above Kincolith; petroglyphs near Wrangel, and several village sites along the Chilkat River, between Haines and Klukwan. Over three hundred photographs, of which one hundred ninety-two were on $6\frac{1}{2} \times 8\frac{1}{2}$ plates, were taken to show as completely as possible all the phases of Indian life met with on the trip at Victoria, North Saanich, Alert Bay, Rivers Inlet, Bella Coola, Port Simpson, along Nass River, at Wrangel and along the Stickine, Iskut and Chilkat Rivers. Photographic prints illustrating ethnological conditions were also purchased wherever possible. Among the ethnological objects seen the few not already represented in the museum collection were purchased. Two Bella Coola totem poles were secured in order that they may be preserved as ethnological specimens and may lend artistic effect to the Northwest Coast Hall in the museum. Arrangements were made to secure other poles from the various areas of the northwest coast culture for the same purpose. Mr. Will S. Taylor, a mural artist, the other member of the expedition, made color studies in oil of the

Indians and their artificial and natural environments. These with the aid of the photographs secured on the expedition and those already in the museum are to be used for mural decorations in the Northwest Coast Hall. These it is hoped will illustrate the home country of the seven groups of natives together with their characteristic occupations.

THE Philadelphia College of Pharmacy announces special lectures to be held from October to April, inclusive, at 3:30 P.M., in accordance with the following schedule:

Friday, October 8—"Examination of Foods," by Dr. W. D. Bigelow, Chief, Division of Foods, U. S. Department of Agriculture, Washington, D. C.

Friday, October 22—"The Application of the Microscope in Legal Investigations," by George M. Beringer, A.M., Ph.M., Pharmacist and Chemist, Camden, N. J.

Thursday, November 4—"American Medicinal Plants and Drugs," by Professor John Uri Lloyd, Manufacturing Pharmacist, Cincinnati, O.

Friday, November 19—"The Typhoid Organism and its Relation to the Public Health," by Dr. A. C. Abbott, Director Laboratory of Hygiene, University of Pennsylvania.

Friday, December 10—"The Manufacture and Testing of Medicinal Plasters," by F. B. Kilmer, Chemist for Johnson & Johnson, New Brunswick, N. J.

Friday, December 17—"Trypanosomes and Trypanosomiasis (The Sleeping-Disease and its Causes)," by Dr. Leonard G. Rowntree, Instructor in Pharmacology and Experimental Therapeutics, Johns Hopkins University.

Friday, January 7—"Plants Injurious to Animals," by Dr. Rodney H. True, Physiologist, Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C.

Friday, January 21—"Physiological Assay, Its Value and Limitations," by Professor H. C. Wood, Jr., Department of Pharmacology, University of Pennsylvania.

Friday, February 11—"The Ultra-microscope and its Application," by Jerome Alexander, Secretary-Treasurer National Gum and Mica Company.

Friday, February 25—"Some of the Important Tests for Essential Oils," by Dr. Francis D. Dodge, Chemist, Oil Distilling Laboratory, Dodge & Olcott, Bayonne, N. J.

Friday, March 11—"The Testing of Cements,"

by Richard K. Meade, B.S., Director Meade Testing Laboratories, Nazareth, Pa.

Thursday, March 24—"Biologic Products," by Dr. S. H. Gilliland, President, Dr. H. M. Alexander & Co., Marietta, Pa.

Friday, April 8—"Modern Methods of Food Manufacture," by L. S. Dow, of the Heinz Preserving Company, Pennsylvania.

Friday, April 22—"State Control of Contagious and Infectious Diseases," by Dr. Samuel G. Dixon, Commissioner of Health of Pennsylvania.

THE *British Medical Journal* states that the natural history department of the British Museum has received a cast of the fossil human lower jaw found recently some seventy feet below the surface in a sand deposit at Mauer, near Heidelberg. It was found along with fossil remains of a rhinoceros and elephant, similar to those met with in the Cromer forest beds, and Dr. Shoetensack, who has published a description of the jaw, considers that it may be referred to the later pleistocene epoch. The discovery of this "Heidelberg man," therefore, takes the antiquity of the human race back to an age earlier than the famous Spy and Neanderthal skulls. The jaw is massive, and has no chin, in which respects it presents ape-like characters, but the teeth are distinctly human; the molars have five cusps, the canines are not specially prominent, and the dimensions of the teeth generally are within the limits of variation at the present day. The skull is exhibited in a case which contains also casts of *Pithecanthropus erectus* from Java, the Neanderthal skull, the Gibraltar skull of the same type, the Spy skull and limb bones, the Cannstadt skull, and the Tilbury skull described by Owen.

THE *Journal* of the American Medical Association says: Several statues of prominent members of the profession in Europe have been installed recently as memorials at the scene of their labors, but the designs of the sculptors have all been ornately allegorical, and many criticisms have been made that this conflicts with the simplicity and love of absolute truth which distinguishes the scientists thus honored. The Brouardel statue at Paris is a bust of the scientist on a tall pedestal with two

graceful female figures below, forensic medicine and hygiene, a little smaller in proportion than the bust, lifting high a garland to wreath it at the base of the bust. It stands in the grounds of the medical school. The Mikulicz memorial at the surgical clinic at Breslau represents in bas relief Mikulicz seated in profile, while two standing female figures, medicine and science, of a size rather dwarfing the recipient, are placing the wreath of immortality on his brow. One can not help imagining that Mikulicz feels rather embarrassed at the situation. The Kussmaul memorial is a bust rather larger than life-size hewn out of the stone forming the base of the memorial, with a smaller allegorical bas relief below of medicine relieving a sick youth. The allegorical design has run riot in the Virchow statue, which is to be merely a statue of Hercules overcoming the Nemean lion, representing Virchow's conquest of disease. There is nothing to suggest Virchow personally except a small bas relief bust below. Something like the simple grandeur and life-like presentation of a St. Gauden's statue of Lincoln is what the friends of the scientists long for as a much more appropriate tribute to the memory of men of science, perpetuating their personality, but the sculptors, as a rule, seem determined to insist on decorative allegorical designs.

THE government is now carrying on work at regular forest experiment stations similar to the agricultural experiment stations in the different states. The first forest experiment station created in this country was the Coconino Experiment Station at Flagstaff, Arizona, established last summer. Investigations covering many phases of forestry in the southwest have already been undertaken at this station. The second forest experiment station has been established this year on Pike's Peak, Colorado. The need for such stations becomes apparent when the long time necessary for handling forest experiments is considered. In agricultural experiments definite results can usually be obtained in one or at most a few years; in forestry, because of the long time required for trees to develop, scores of years are often required to complete a

single experiment. All experimental work is conducted under the direction of men who have had training in technical and practical forestry, and every experiment is intended to have a direct bearing upon some problem which vitally concerns the management of the forest. Under this system any new plan can be thoroughly tried before being put into practice on a large scale, and thus the injury resulting from mistaken practises can be minimized. The greatest technical problem which now confronts the forester in handling the great pine forests of Arizona and New Mexico is that of establishing a new stand of trees to replace the old timber which is cut off. This was the first problem undertaken by the Coconino Experiment Station. Much information regarding the factors influencing natural reproduction has already been secured, but many years of systematic study will be required to fully solve the problem. The feasibility of artificial regeneration by planting and sowing is also being tested. The latter experiments, for the sake of economy, are being conducted on the smallest scale which will insure reliable results applicable to general conditions. The plans for the near future provide for a detailed study of the problems concerning the natural and artificial regeneration of other commercial trees such as Douglas fir, Engelmann spruce and the junipers.

SOME account of the work of the Hamburg Expedition to the Pacific is given in *Globus* and summarized in the *Geographical Magazine*. Its principal field of operations has been the little-known island of New Britain (New Pomerania), the first crossing of which, in its full width, has been effected by the expedition. As mentioned in a previous note, the expedition, which is under the leadership of Dr. Fülleborn, has the benefit of a vessel specially chartered for the purpose, and its work has been greatly facilitated thereby. A preliminary cruise along the north coast of the island showed that the eastern district—that of Nakanai—which has not been supposed to extend further west than Open Bay, in reality extends for more than half the length of the north

coast, being followed, further west, by those of Talasea and Bariai, in which the influence of New Guinea culture is much more manifest. Owing to the exposure of the north coast to the northwest monsoon during the early months of the year, it was decided to begin serious work on the south coast, which was followed from east to west, a large number of coast villages being visited, and some communication opened with the very primitive dwellers in the back country. The observations permit the definition of several distinct culture regions on this coast. Artificial deformation of the skull was found to be practised, especially between Montague Harbor and Cape Pedder. The voyage extended to the New Guinea coast (where a key was found to various facts in the ethnology of western New Britain), and a visit was paid to Sir George Rooke or Umbai Island. Returning, a landing was effected at the mouth of the Pulie River, whence a trade route leads across to the north coast, and this was utilized for the crossing of the island by Dr. Fülleborn and two of his European companions, who afterwards returned by the same route. The crossing occupied seven days, and the country was found to be covered with a uniform thin forest, broken only by the extensive plantations of the natives. The health of several members of the expedition has unfortunately suffered a good deal.

UNIVERSITY AND EDUCATIONAL NEWS

YALE UNIVERSITY has received from Mr. William D. Sloane and Mr. Henry T. Sloane the sum of \$475,000 to build, equip and endow a physical laboratory. This laboratory, it is understood, will replace the present Sloane Physical Laboratory, and will be used by the academic, the scientific and the graduate departments. Yale University has also received \$25,000 from Mr. Alfred G. Vanderbilt for general endowment, and \$15,000 from Mr. G. H. Meyers for the endowment of the Forest School, of which he is an alumnus.

COLUMBIA UNIVERSITY has received gifts amounting to about \$236,000, of which \$112,500 is from Mr. W. H. Charpentier, to be

added to the J. S. Charpentier fund, and \$100,000 is given anonymously toward the cost of Kent Hall.

THE Pratt Institute of Brooklyn has received the sum of \$1,750,000 from Mr. Charles M. Pratt, son of the founder and now its president, and from his five brothers and his sister, Mrs. E. B. Dane.

DR. D. K. PEARSONS has offered to give \$100,000 to Berea College, provided that the sum of \$400,000 is otherwise subscribed.

MR. N. B. DUKE has made a further gift of \$50,000 to Trinity College at Durham, N. C.

It is reported that the Free University of Brussels has received an anonymous gift of 4,000,000 francs for its scientific departments.

DR. GEORGE E. FISHER, professor of mathematics in the University of Pennsylvania, has been appointed dean of the college.

At the University of Nebraska, Professor Robert H. Wolcott has been made professor of zoology and acting dean of the College of Medicine as successor of Henry B. Ward, who has gone to the University of Illinois.

PROFESSOR GUSTAVE F. WITTIG, of the electrical engineering department of the University of Maine, has resigned to become head of the electrical engineering department of the University of Alabama.

DR. BYRON B. BRACKETT has been appointed to the chair of electrical engineering at the South Dakota State College. He has held the chair of electrical engineering at the Clarkson School of Technology since 1903.

At Harvard University, Dr. Edwin Katzenbogen has been appointed lecturer in abnormal psychology, W. J. Risley, A.M., instructor in mathematics, and A. V. Kidder, A.B., Austin teaching fellow in anthropology.

DR. H. B. KRIBS has been promoted to an instructorship of zoology at the University of Pennsylvania and Dr. H. M. Jacobs to a similar position in the place of Philip P. Calvert, who is on leave of absence. In the same department Dr. Harold Colton has been appointed assistant.

THE following appointments have been made in the chemical department of the

North Carolina College of Agriculture and Mechanic Arts, for the year 1909-10: Dr. L. F. Williams promoted from an instructorship to an assistant professorship; Burton J. Ray, A.B. (Wake Forest, Ph.D., Cornell), instructor in organic chemistry and assistant chemist in the Experiment Station; Frank W. Sherwood, B.S. (North Carolina A. & M.), assistant chemist in the Experiment Station.

REGINALD E. HORE, of Toronto, formerly instructor in the University of Michigan and in Queens University, has been appointed instructor in petrography in the Michigan College of Mines, Houghton.

DR. E. B. HUTCHINS, Ph.D. (Wisconsin), has resigned the professorship of chemistry at Carroll College to accept the position of manager of a manufacturing establishment in Fond du Lac, Wis. S. B. Hopkins, Ph.D. (Johns Hopkins), has been elected to the position at Carroll College.

DR. A. H. GIBSON has been elected professor of engineering at University College, Dundee, to succeed Professor Fidler, who has resigned.

PROFESSOR H. KOSSEL, director of the hygienic institute at Giessen, has received a call to Heidelberg. His brother, Dr. A. Kossel, is professor of physiology at Heidelberg.

DR. F. HARTMANN, of the Astrophysical Observatory at Potsdam, has been appointed professor of astronomy at Göttingen and director of the observatory.

DISCUSSION AND CORRESPONDENCE

NATURE STUDY

TO THE EDITOR OF SCIENCE: In the advertisement of a new book on "Nature Study" I find the following statement:

There is a great deal of talk about nature study by persons who have only the haziest idea of what they mean by it.

With this I am in cordial agreement. Why the term "nature study" should be appropriated as applying to that partial range of the phenomena of the physical universe which is the particular province of the biologist I have never been able to see. I believe that the

word *φύσις* is the equivalent of the Latin *natura*, for which the English is *nature*. The derivation of the word physics is apparent. The old term "natural philosophy" is an excellent one, sanctioned by the best use from Newton to Thomson and Tait, and serving as a contrast to "natural history" or the purely descriptive part of that science of nature which does without philosophy. The term physics is shorter and belongs to other languages than English, and it seems to me that if the biologists desire a correspondingly convenient term it is for them to invent one, and not to preempt the whole of nature, which is greater than any part.

ARTHUR GORDON WEBSTER

NEON AND ELECTRIC WAVES

TO THE EDITOR OF SCIENCE: Professor J. Norman Collie, F.R.S., recently discovered that when perfectly pure neon is enclosed in a glass tube with a globule of mercury and shaken, it glows with a bright orange-red color, and when the globule rolls it appears to be followed by a flame. This phenomenon takes place at ordinary pressure.

Sir William Ramsay has found that neon is the best conducting of the gases and that it readily becomes luminous under the influence of electric waves. Professor J. A. Fleming, F.R.S., uses a neon tube as a detector for the wave-length of Hertzian waves in his apparatus for measuring them.

During a recent visit to Sir William Ramsay I had the pleasure of seeing the astonishing quantity of over 500 c.c. of pure neon which he had obtained from about 120 tons of air. While there, Professor Collie very kindly presented to me a tube of neon, under about one half an atmosphere pressure, containing a globule of mercury which showed the "Collie effect" very strikingly.

Returning from Liverpool, July 2, on the steamer *Baltic*, I was given opportunity during the voyage, by Mr. Bates, the chief operator of the wireless, to try the neon tube as an instrument for the visual reading of the wireless message. We experimented with it during two nights and found that the neon glowed beautifully in response to the waves sent out,

but the waves as received were too weak to visibly affect the neon, although we tried every arrangement of the limited apparatus at our command. The electric wave sent out by the *Baltic's* apparatus was, according to Mr. Bates about 800 feet long.

WM. L. DUDLEY

VANDERBILT UNIVERSITY

FUNDULUS LUCIE AGAIN IN NEW JERSEY

ON July 28, 1909, I secured a single small example of this species in a little inlet, which empties into Barnegat Bay several miles below Seaside Park, on Island Beach in Ocean County. The inlet was well choked up with grass, so that the water was perfectly still and formed a little brackish pond. Only multitudes of *Cyprinodon variegatus* and many young *Fundulus majalis* were found associated. I mention this record simply as it is the most northern at which *Fundulus lucie* is known to occur.

HENRY W. FOWLER

ACADEMY OF NATURAL SCIENCES,
PHILADELPHIA, PA.

THE BURDEN OF NOMENCLATURE

THE scientific white man's burden is largely one of names and no one knows better than the zoologist how great the incubus has become. Names in boundless profusion are heaped upon him—many of them needless synonyms—and, worst of all, no two zoologists can agree upon any one particular name for any one particular genus or species. The efforts of individuals, of committees and of conventions to enforce agreement according to rule have failed and it is not surprising that widespread disgust prevails because of the nomenclatural confusion which exists. No code of rules yet devised for the purpose of fixing a single name on each entity has proved adequate to check the changes which go merrily on year after year. In fact zoological nomenclature to-day seems to be little more than an intricate game of names, fascinating sport for its faithful devotees, but an intolerable nuisance for the uninitiated many! A few specialists interested in the game have made all the rules and done all the playing, and they are directly responsible for the

changes. Nothing has been let alone long enough to become stable, not even the codes.

One of the principal reasons why codes fail is because individual opinion interprets them. Conventions bark up the wrong tree—it is not rules for “eliminating” genera that are needed so much as rules for eliminating individual opinion. The zoologist consumer would seem to be in the clutches of a word-trust that furnishes him not with what he needs but with what he can get according to canon X, Y or Z; and we all know what a fertile field for the exploitation of rules and canons ornithology has been. In the latest code of nomenclature—that published by the American Ornithologists' Union in July, 1908—the same ponderous machinery constructed in 1842 is made to do duty. The wheels and cogs have been repaired and repolished several times during the intervening years but as a machine for grinding out stable names it has proved signally inadequate. A check-list of North American birds issued in 1886 has already been revised and corrected, according to code, in no less than fifteen supplements and the end is not in sight. This is but a sample of the instability to be found in all branches of zoology.

Now, as a matter of fact, unpractical zoologists have long put up with a nuisance that business men would not have tolerated a moment. Practical business men settled telegraphic nomenclature, for instance, by publishing a code of over a thousand million pronounceable words with at least two letters difference between them, and surely zoological nomenclature, with but a small fraction of that number of names, should not be a hopeless proposition. We all know how many things are standardized—even the languages of France and of Spain. If a national academy sets the standard for language, are zoologists unable to establish a standard for zoological language by an international academy of their own? Something of this sort is urgently needed, for nomenclature is an art and not a science. Codes do not evolve but are made for convenience and we should quit bowing down to precedent and burning incense before the shrine of priority if we seek stability. Priority is rather a bog from which

the nomenclatural muck-rakers exhume the fossil names of a past age. We shall always be at the mercy of forgotten names tucked away in stray volumes unless there be some "statutes of limitation"—the bugbears of code makers. Let the upturning of the names of obscure writers be stopped and the remodeling of codes with fresh interpretations of their canons be prevented. It is not justice for the dead zoologist that we need so much as justice for the living, and even now the dead get no recognition if they violate the rules of a game unknown in their day. The "statute of limitation" needed at the point where codes break down is a responsible body of men whose rulings will be respected by every scientific man who cares more for stability in names than he does for his own preferences.

In my opinion, the nomenclature of the future is likely to be eclectic and the names fiat, the final court of appeal being an international committee. Such a committee, with the flood of evidence available nowadays, could soon put an end to all the tiresome quibblings over the fixing of generic types, the preoccupation of names, the spelling of words and all the other academic questions over which the most spirited disputes have arisen. It should publish authoritative lists of genera and species; for zoologists want names as handles for use, not toys to be played with according to this rule or that canon. If zoological names are ever to be put on a stable basis, first of all a stable committee is needed—and it is to be hoped the Nomenclatural Commission of the International Zoological Congress may prove to be such a committee—and then it should publish lists that would spike the canon of priority and obliterate individual opinion. Details may not be worked out in a day, but the thing can be done and once done it would not have to be done again unless nomenclature should evolve into something very different from what it now is. Probably zoologists have followed beaten paths too long to allow of any radical changes in the methods of determining names, but it is little short of ridiculous to bicker over the comparatively few names that rules do not fix. It is for these names that a

majority vote of a committee is needed. Subcommittees in the different branches of zoology could furnish the international committee with approved lists of names for final revision and publication, and the zoological world should turn its back upon others than those of the international list. In theory, at least, the cure for nomenclatural instability is very simple and the two essential elements for success are a permanent, working committee and funds for publication. We should be the masters not the slaves of codes, remembering that "zoological nomenclature is a means, not an end, of zoological science."

JONATHAN DWIGHT, JR.

SCIENTIFIC BOOKS

A HALF CENTURY OF DARWINISM¹

Of the many gatherings, large and small, to commemorate the hundredth anniversary of the birth of Charles Darwin, or the fiftieth anniversary of the "Origin of Species," the two most notable were the one held at Baltimore in January, and the one held at Cambridge in June of the present year.

At the Baltimore meeting, ten addresses were spoken, all relating to the lines of progress in our knowledge of evolution, and the relation of Darwin to this knowledge.

In connection with the meeting at Cambridge, essays were presented covering the relation of our knowledge of evolution to various phases of modern thought.

Except in brevity, the two volumes in question are essentially similar. The same motive is present in both. At Baltimore, all the speakers save one were American. At Cam-

¹ "Darwin and Modern Science," essays in commemoration of the centenary of the birth of Charles Darwin, and of the fiftieth anniversary of the publication of the "Origin of Species." Edited by A. C. Seward, Cambridge University Press (twenty-nine essays).

"Fifty Years of Darwinism," "Modern Aspects of Evolution," centennial addresses in honor of Charles Darwin, before the American Association for the Advancement of Science, Baltimore, Friday, January 1, 1909. New York, Henry Holt & Company (ten addresses, with an introductory chapter).

bridge, eleven were British, two American, six German, one French, one Danish and one Dutch. But this is merely an incident. Science takes no cognizance of state or racial boundaries, nor of sex, for it is only in passing that we need notice that one of the English essayists is a woman.

Among characteristics of these essays and addresses as a whole, we may note the broad tolerance and friendly tone shown by all the writers, without exception. All recognize the intellectual supremacy of Darwin, although most of them have made some addition, large or small, to the mass of fact and theory gathered by the master. Each one is gently insistent on his own point of view. We may compare Darwin to an explorer of a great region, to whom fell the making of the first map. While in many ways details have been added to this map, not much of the original scheme has been altered or taken away. While many shrill voices from time to time have been raised in criticism of one feature or another of "Darwinism," yet the common sense of the body of biologists has steadily maintained the integrity of the original chart. Natural selection very likely is not "allmächtig." Darwin never claimed that it was. But it is potent for all that, and the other factors in evolution work with it, and not in place of it. The scheme of the evolution of species, through variation and heredity on the one hand, and the selective influence of the environment on the other, has not greatly changed since the date of the "Origin of Species." The method, degree and to some extent the causes of variation, have been critically and successfully studied. The meaning and the machinery of heredity have been the subject of most fruitful investigation and experiment. Natural selection has been subjected to the most searching analysis, and the fact that its effects vary under varying conditions has been clearly brought out. But it still remains the only general cause of the universal phenomena of adaptation of life to environment. Isolation has been separated from selection as a factor theoretically distinct, but practically coexistent. The supposed Lamarckian factors have disappeared, to

reappear again in unknown and perhaps unknowable forms. Theories of elemental species, unit characters and the like, have arisen to meet the facts and guesses involved in the investigations of mutation and the rediscovery of Mendelism, taking their place alongside of Darwin's bold hypothesis of pangenesis, and, like pangenesis, to pass away when the hypotheses are no longer needed. With all this, on the whole, the scheme of organic evolution, as presented in the "Origin of Species," still holds as an outline. The work of fifty years has intensified the main features of the sketch, and has constantly added to the work of the master, without obliteration of any essential details.

The instruments of precision in biological research have taught us many things. They have shown a physical basis of heredity, and by this means have made a theory of heredity possible. Scientific experiment has added many details, as to the development of cells, as to the behavior of hybrids, as to the processes of selection, as to the effects, direct and indirect, of many sorts of environments. Embryology has shown the method of development of each type of animal and plant. Our knowledge of extinct forms has grown by leaps and bounds. Even the lower ancestors of man have appeared in the rocks and in the forms the great morphologists have expected them to assume. Systematic geologists have gathered together the lessons of morphology, embryology and paleontology, to be applied to the construction of ancestral trees, while our knowledge of geographical zoology and botany has kept pace with the most rapid increase of knowledge in any other field. With all this, the entire face of philosophy, social science and even of theology, has been altered by the idea of descent, with modification, through natural causes, the most noteworthy being that of the survival of the fittest in the varied conditions of life.

In the American volume, Professor Thomas C. Chamberlin contributes the introductory chapter on the continuation of the Darwin impetus, admitting, if necessary, that "if the atom shall show an authenticated pedigree," it will "take its place in the procession of the

derived, with the plant, the animal, the earth and the stars." Professor Edward B. Poulton discusses the progress of biology in the "Fifty Years of Darwinism." Professor John M. Coulter discusses natural selection from the standpoint of the botanist, with an ingenious treatment of the "non-adaptive adaptations" that natural selection does not readily explain. Professor David S. Jordan discusses isolation as a factor in species making, taking the ground, as stated by Dr. Ortman, that "the four factors, variation, inheritance, selection and separation (isolation) must work together to form different species. It is impossible that one of these should be by itself, or that one could be left aside."

The cell, in relation to heredity and evolution, is discussed as by one having authority, by Professor Edmund B. Wilson. Professor D. T. MacDougal speaks of the "Direct Influence of Environment"; Professor W. E. Castle of "The Behavior of Unit Characters in Heredity." Professor Charles B. Davenport treats of "Mutation," finding "certain evident elements of truth" in the speculations arising from the experiments of de Vries. Dr. Carl H. Eigenmann discusses "Adaptations," recognizing the fact stated by Weismann, that they "arise whenever needed if they are possible," considering the question of their origin as "the problem of problems," and giving to the whole a suggestion of a "Lamarckian" trend.

Professor Henry F. Osborn discusses Darwin and paleontology, with a leaning toward orthogenesis, a theory which needs only to be defined to receive general acceptance. Evolution and psychology are treated by Professor G. Stanley Hall, who finds that the psychic powers of man are but "new dispensations" of those of the lower animals, and that the debt of psychology to Darwinism is not one whit less than that of zoology or botany. Without the idea of descent through natural processes, all biological sciences are without meaning.

The Cambridge volume covers a wider range of subjects, including the influence of Darwinism on astronomy, philology, philosophy and theology, which last subject is taken more seriously in England than in America.

The veteran botanist, Sir Joseph Dalton Hooker, furnishes an introductory letter to the editor, Professor A. C. Seward. Professor J. Arthur Thomson discusses Darwin's predecessors and their relation to evolution. Professor August Weismann discusses the selection theory, which is fundamental to "Weismannism," as to Darwinism. Professor Hugo de Vries discusses variation from a point of view of experimental botany. "Heredity and Variation in Modern Lights" are treated by Professor W. Bateson. In this able essay is a footnote on "the isolation of the systematists" as "the one most melancholy sequela of Darwinism." "Should there not be something disquieting in the fact that among the workers who come most in contact with specific differences are to be found the only men who have failed to be persuaded of the unreality of these differences?" This strikes the writer as not at all just. Those systematic workers worthy of the name, in all countries, were among the first converts of Darwin. Not that Darwin's arguments persuaded them, but that their own studies showed that species can not be permanently separated as categories from races and varieties. But to the systematists is entrusted the bookkeeping of zoology and botany. Without the rules and the minute discriminations of taxonomy, all biological science would be lost in a maze. However impertinent the distinction between a variety and a species, a difference is a difference, and each term represents a degree of variation which has become hereditary and relatively permanent, and hence to be discriminated by those who deal with the details of organic being, from individual variation, and from alterations due to mutation or environment. The supposition that systematic zoologists and botanists are essentially dullards who do not know what is going on outside, and do not know what species are, is one frequently made by theorists or experimenters, who do not appreciate the methods of precision necessary in this particular field.

Systematists are not deceived in the matter of the despised species of British brambles but it is as legitimate and it may be as fruit-

ful a study to work out the effects of isolation, hybridization and climate on brambles as to test the effects of various alkaline salts on the eggs of a starfish. Good work counts, whatever its subject matter.

Professor Edward Strassburger discusses the "Minute Structure of Cells in Relation to Heredity," claiming with Darwin that "invisible gemmules are the carriers of hereditary characters, and that they multiply by division." This hypothesis he implies might have been developed by Darwin, had not his genius been "confined by finite boundaries by the state of science in his day." The "Descent of Man" is discussed by Professor G. Schwalbe. In this regard, he considers that Darwin's work is unsurpassed. "The more we immerse ourselves in the study of the structural relationship between apes and man, the more is our path illumined by the clear light radiating from him."

Professor Ernst Haeckel treats of "Darwin as an Anthropologist," in like sympathetic fashion.

Mr. J. G. Frazer discusses "Primitive Theories of the Origin of Man." Professor Adam Sedgwick discusses the "Influence of Darwin on the Study of Animal Embryology." Professor W. B. Scott treats of the "Paleontological Record as Regards Animals," and Mr. D. H. Scott, as regards plants. Professor George Klebs treats of the "Influence of Environment on the Forms of Plants," and Professor Jacques Loeb on the "Experimental Study of the Influence of Environment on Animals." Professor Edward B. Poulton emphasizes the value of color in the struggle of life. Sir William Thistlethorn Dyer treats of the "Geographical Distribution of Plants," and Dr. Hans Gadow of the "Geographical Distribution of Animals." Mr. J. W. Judd discusses "Darwin and Geology," and Mr. Francis Darwin, "Darwin on the Movement of Plants." Professor K. Goebel has an essay on the "Biology of Flowers," Professor C. Lloyd Morgan one on "Mental Factors in Evolution," and Professor Harald Höffding one on the "Influence of the Conception of Evolution on Modern Philosophy." Professor C. Bouglé discusses "Darwinism and Sociology," Rev. P.

N. Waggett, the "Influence of Darwin on Religious Thought." This influence Mr. Waggett finds "from a Christian point of view, satisfactory," as all movements toward truth ought to be. It may be an "advance of theology" when theologians retreat. Mr. Waggett thinks that a "bolder theism" is now needed, and now justified.

Dr. Jane Ellen Harrison treats of the "Influences of Darwinism on the Study of Religions." The scientific study of religions begins with the Darwinian conceptions. Dr. P. Giles discusses "Evolution and the Science of Language." Professor J. Bury writes luminously on "Darwinism and History"; Sir George Darwin on the "Genesis of Double Stars," and Mr. W. C. D. Whetham has the final essay on the "Evolution of Matter." He doubts whether such cases of atomic disintegration as we now know can be characterized as "Evolution," and the question whether primeval matter was more or less complex, or both, than the matter of to-day, is still unsettled.

Through all these essays and addresses runs the vein of veneration for Darwin the man. The words used by the present writer in 1882, he still finds pertinent:

Darwin lies in Westminster Abbey, by the side of Isaac Newton, one of the noblest of the long line of men of science whose lives have made his own life possible. For every truth that is won for humanity takes the life of a man. Among all who have written or spoken of Darwin since he died, by no one has an unkind word been said. His was a gentle, patient and reverent spirit, and by his life has not only science, but our conception of Christianity, been advanced and ennobled.

DAVID STARR JORDAN

THE FAUNA OF CHILE

PROFESSOR CARLOS E. PORTER, C.M.Z.S., director of the Natural History Museum of Valparaiso and of the "Revista Chilena de Historia Natural," is about to publish the first volume of a new work which bears the title of "Fauna de Chile," being a methodical and descriptive catalogue of the animals living in the Republic of Chile.

This work has been in preparation for a

number of years and the volumes II. to X. (large octavo) are to be published as soon as the manuscript of each is finished, with the assistance of numerous European and American specialists. This work, being thus brought up to date according to modern standards, will be indispensable to all museums and libraries of natural history.

Volume I. will contain the mammalia, by Mr. John A. Wolffsohn, C.M.Z.S., with numerous original illustrations in black and colored plates and photo-engravings in the text.

M. J. R.

NOTE ON THE OCCURRENCE OF HUMAN
REMAINS IN CALIFORNIAN CAVES

In the course of an investigation of some of the limestone caverns in California during the last four years, a number of cases have been noted in which human remains were found in such situations as to indicate that their entombment was not of historically recent date. In no instance have any specimens been discovered which can be said to be of Quaternary age, although some of the occurrences are of such nature that it would be difficult to prove that the remains were buried during the present period.

The writer has already called attention¹ to the occurrence of human remains in Mercer's Cave in Calaveras County, and in the Stone Man Cave in Shasta County, under conditions which certainly suggest a considerable antiquity. In Mercer's Cave a number of human skeletal remains were found in close proximity to the bones of a Quaternary ground-sloth. The bones of both sloth and man were incrustated with a deposit of stalagmite, the incrustation on the sloth bones being considerably thicker than that on the human remains; and it is not probable that they were buried at the same time. It is, however, true that stalagmite deposits may be very uneven, and it is possible that the covering on the ground-sloth was formed in a shorter time than the thinner layer on the human bones.

The remains in Stone Man Cave were dis-

¹ "Recent Cave Exploration in California," *American Anthropologist*, N. S., Vol. 8, No. 2, p. 221.

covered in a remote gallery of this extensive cavern. The greater number of the bones were embedded in a layer of stalagmite which enveloped them to the thickness of one eighth of an inch or more. A vertebra which was obtained many years ago from this locality is found to have lost most of the organic material, and the cavities are largely filled with calcite crystals.

In neither of the cases just described is it possible to fix the age of the remains, but the impression given in both instances is that some centuries have elapsed since the skeletons came into the position in which they were found.

Another interesting occurrence of human bones has recently been brought to the notice of the writer by Dr. J. C. Hawver, of Auburn, California. During the past few years Dr. Hawver has engaged in an energetic exploration of the limestone caves in the vicinity of Auburn, partially at the instance of the University of California, but largely on his own resources. Hawver Cave, discovered by him and recently named in his honor, has been explored and described by Mr. E. L. Furlong,² but Dr. Hawver has continued the exploration of this cavern farther than it was carried by the university. In March, 1908, while attempting to open what Dr. Hawver supposed to be an ancient passageway into the lower cave, a number of human bones were found at a depth of twenty feet below the surface, under a mass of cave earth, fallen rocks and soil, over twelve feet in thickness. The remains lay at the lower end of a passageway which has evidently been closed for a long period. In this case, as in that of Mercer's Cave, remains of extinct animals undoubtedly of Quaternary age were found near the human bones, but the degree of alteration of the unquestionably Quaternary bones differs from that in the human skeletons. Some of the human bones were embedded in a cemented breccia consisting largely of angular fragments of limestone. So far as examined the bones seem to have lost most of their organic matter. A fairly preserved skull in the collection does not differ strikingly from the crania of the

² Furlong, E. L., *SCIENCE*, N. S., Vol. 25, p. 392.

modern California Indians, although no comparative study has yet been made by a specially trained craniologist.

It is not possible in the case of the Hawver Cave relics to prove Quaternary age for the human bones. As in the other instances mentioned, the inference is, however, that the date of their entombment preceded the present day by centuries, if not by millennia.

JOHN C. MERRIAM

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SPECIAL ARTICLES

THE SCIENCE OF EXOTIC MUSIC¹

If architecture is the king of the fine arts, commanding the outward services of others, music is their queen, imposing the inward laws by which all rule themselves. The notions of harmony, pitch, scale, tonality and key, applied in fine art generally, have in music first become clear enough to receive names. The theory of all the arts awaits to this day the exact grasp of these ideas which the investigation of musical structure will some time give.

¹ A. J. Ellis, "On the Musical Scales of Various Nations," *Journal of the Society of Arts*, XXXIII., 1885. J. P. N. Land, "Ueber die Tonkunst der Javanen," *Vierteljahrsschrift für Musikwissenschaft*, 1889, 1. C. Stumpf, "Lieder der Bella-kula Indianern," *Vierteljahrsschrift für Musikwissenschaft*, 1886, 4; "Phonographirter Indianer-melodien" (review of "Zuñi Melodies"), *Vierteljahrsschrift für Musikwissenschaft*, 1892, 1; "Tonsystem und Musik der Siamesen," *Beiträge zur Akustik und Musikwissenschaft*, 3, 1901; "Das Berliner Phonogrammarchiv," *Int. Wochenschrift für Wissenschaft, Kunst und Technik*, 22 Februar, 1908. Franz Boas, "The Central Esquimo," Bureau of Ethnology, Sixth Annual Report, Washington, 1888; "The Kwakiutl Indians," U. S. National Museum, Report for 1895. B. I. Gilman, "Zuñi Melodies," *Journal of American Archeology and Ethnology*, I., Boston, 1891; "Some Psychological Aspects of the Chinese Musical System," *Philosophical Review*, I., Nos. 1 and 2, New York, 1892; "Hopi Songs," *Journal of American Archeology and Ethnology*, V., Boston, 1908. Miss Alice C. Fletcher, "A Study of Omaha Indian Music: With a Report on the Structure of the Music by John C. Fillmore," Peabody Museum, Cambridge, U. S. A., 1893; "The Hako: A Pawnee

Hitherto the study of music has labored under an essential disadvantage compared with that of painting and sculpture. Passing events can not be scrutinized as permanent objects can. Time is lacking for their close determination; and once experienced they become memories only. Precision and revision—twin essentials of science—are possible in observing a combination of color and form, but not of tone. Hence the study of music as we know it is a study of scores. Connoisseurship, pictorial and plastic, has found its material wherever paintings and sculptures exist: musical criticism only where scores exist; that is to say only in modern Europe. In order to bring accurate method to bear on non-European music some means for reproducing it at will is demanded. If we can choose the moment when data of sense are to present themselves we can prepare for their precise registry; and the power to repeat our impressions gives the power to correct them. Such a means has been furnished within our own time and our own country. Chiefly by the aid of the phonograph inquiries into exotic music have within

Ceremony," Bureau of Ethnology, Twenty-second Report, Part 2, Washington, 1903. O. Abraham and E. M. von Hornbostel, "Studien über das Tonsystem und die Musik der Japaner," *Sammelbänder der Int. Musikgesellschaft*, IV., 2, 1903; "Ueber die Bedeutung des Phonographen für vergleichende Musikwissenschaft" and "Phonographierte türkische Melodien," *Zeitschrift für Ethnologie*, XXXVI., 2, 1904; "Phonographierte indische Melodien," *Sammelbänder der Int. Musikgesellschaft*, V., 3, 1904; "Phonographierte Indianermelodien aus British Columbia," Boas Memorial Volume, New York, 1906. E. M. von Hornbostel, "Phonographierte tunesische Melodien" (1905?); "Notiz über die Musik der Bewohner von Sud Neu Mecklenburg" (1905?); "Ueber den gegenwärtigen Stand der vergleichenden Musikwissenschaft," *Int. Musikgesellschaft*, Basler Kongress, 1906. "Ueber die Musik der Kubu," Städtischer Völkermuseum, Frankfurt, 1908. "Phonographierte melodien aus Madagaskar und Indonesien," Forschungsreise S. M. S. *Planet*, V., 6, Berlin, 1909. Compare also: Charles K. Wead, "Contributions to the History of Musical Scales," U. S. National Museum, Report for 1900. W. C. Sabine, "Melody and the Origin of the Musical Scale," *SCIENCE*, May 29, 1908.

a generation attained the standing of a branch of science.

The closer study of instrumental forms undertaken in England by the late A. J. Ellis in 1885 and carried on by J. P. N. Land in Holland laid the foundation for the new research. Five years later, in 1890, Dr. J. Walter Fewkes, of the Hemenway Southwestern Expedition, first used the phonograph in the study of aboriginal folk lore, and collected the records of American Indian singing which in the following year formed the basis of the writer's study of Zuñi melodies. The notations of singing in Miss Alice Fletcher's monograph on the "Music of the Omaha Indians," published in 1893 with a report by the late J. C. Fillmore on the structure of the music, although made by ear, were based upon years of experience in the field. In later extended studies of Indian life and art by Miss Fletcher, Dr. Boas and Dr. Dorsey the phonograph has aided. The investigation of exotic music had already occupied Professor Carl Stumpf, now of Berlin and lately rector of the university. Professor Stumpf in 1886 made an accurate study by ear ("*gleichsamer phonographischer Nachbildungen*") of the singing of Bellakula Indians from British Columbia, in 1892 gave an incisive discussion of the Zuñi melodies, and in 1901 published an extended investigation of Siamese music, based on phonographic records and the examination of instruments. Apart from the writer's volume on "Hopi Songs" (1908) all the other contributions to the phonographic study of the non-European art have come from the Psychologisches Institut of Berlin University, of which Professor Stumpf is director, and are the work of his assistants, Dr. E. M. von Hornbostel and Dr. O. Abraham. Meanwhile collections of phonographic records of exotic music have been founded in Berlin, St. Petersburg, Vienna, Paris, Washington, Chicago, Cambridge and elsewhere.

A body of material has thus been gathered and in part investigated, from which already a rich yield of new views of the art of music and its foundations in the mind of its makers either has been reaped or plainly stands ready for the harvest.

First: Anharmonic structure. As far as is known, true harmony does not exist outside of European music. Harmonic feeling has been attributed to the North American Indians; but it does not express itself in part singing and its existence is not yet satisfactorily established. It now seems altogether probable that in spite of the great development of music elsewhere no peoples but the European have ever based an art of tone upon the disturbance and readjustment of consonant combinations of notes.

Second: the isotonic scale. The initial investigations of Asiatic instruments by Ellis and Land pointed to a new formal principle deeply differentiating the music of east and west. There are neither semi-tones nor whole tones in certain scales of Siam and Java. Instead the octave is divided into equal parts, either five $\frac{6}{5}$ tones or seven $\frac{6}{7}$ tones. Professor Stumpf's later phonographic study confirmed these conclusions. A principle of tone-distance supplants the principle of consonance on which the European musical system is based. Music becomes isotonic instead of diatonic as Europeans have hitherto known it. We seem at last out of hearing of Greek tetrachords, as Stevenson, dropping anchor in the harbor of Apia, felt at last beyond the shadow of the Roman law.

Third: heterophony. A Siamese orchestra plays neither in unison nor in parts, for each of the various instruments takes its own liberties with a melody approximately followed by all. To this musical method Professor Stumpf applies the Platonic term "heterophony," and wonders whether the Siamese do not give us a glimpse of what Greek music actually was—which, as Moritz Hauptmann once remarked, "We now know only from the writings of theorists, *i. e.*, do not know at all." Such a structure results sometimes in unisons, sometimes in parallel intervals, but as often in dissonances either transient or unresolved.

Fourth: neo-tonality. As in European music so in many exotic melodies, though not in all, one note is distinguishable as the principal one. But whatever the European feeling of tonality may be, and the point is not yet clear, the regard for a principal note which

takes its place among some non-European peoples would appear a widely different thing. In some cases there is no tendency to end on the tonic note. In Kubu scales Dr. von Hornbostel finds absolute pitch an element. There remain the instances like that of Javese music in which no principal note is discoverable at all. New musical factors reaching deep into the heart of the art, seem revealed in these fundamental divergences.

Fifth: rhythmic complication. Hindu and African music is notably distinguished from our own by the greater complication of its rhythms. This often defies notation. Professor Stumpf remarks that a group of African drummers sometimes perform different rhythms simultaneously; as it were a chord of rhythms like the chords of notes to which different performers contribute in harmonic music. For its jejune structure in tone non-European music makes amends by a rhythmic richness beside which that of European music seems in its turn poverty. In Dr. von Hornbostel's words, "The vertical in the score (harmony) is the enemy of the horizontal (rhythm)." It is not impossible that this revelation of elaborate rhythm in non-European music may affect the future development of our own. The east has already profoundly influenced our painting, as it may perhaps, through some view-point hitherto unguessed, yet influence our sculpture.

Sixth: the melody type. For one element in exotic music no recognized counterpart exists in our own, and it is difficult for the European mind to obtain a clear conception of it. This is the Hindu Raga; apparently a type of melody with a delicate and abstract but very definite expressiveness. A certain Raga may, it is said, be attuned only to a certain season or time of day, and may shock the sense at any other time. This is mysterious, but the whole subject of musical expressiveness is wrapped in a mystery which the isolated students who have attacked it inductively are only beginning to enter. How can the choice of a certain step of the scale as tonic determine a "soft Lydian mode" demoralizing to the fancy? Or was modality itself in Greek music a type of melody otherwise determined

and perhaps akin to the Hindu Raga? Why should medieval times have proscribed the major mode as the "*Modus Lascivus*"? In general why should a minor third upward from the tonic sound sad, and downward sound serene? Is the differing imaginative character of different modern keys a fact or a fancy? Do not all consist of the identical scale performed only at a different pitch? That these questions are, in the present state of musical science, unanswerable, evidences the indifferent equipment of Europeans for the study of the Raga. For the present it is another puzzling datum of musical expressiveness which may some day yield an explanation of wide applicability.

Seventh: scale versus song. Still another fundamental difference from European music has been suggested to the writer by the singing of the Pueblo Indians. These musicians do not seem to grasp the notes they utter as steps in any scale at all, but simply as constituents in a familiar sequence of tones, unrolling itself before the memory. This characteristic may prove the differentia of pure song from music as determined by instruments. A scale would then appear the creation of mechanisms giving fixed tones, like the lyre or the panpipes, the voice by itself knowing none. America would appear the continent of song *par excellence*, the one place where instrumental music has never attained a development capable of putting an end to the liberty of the voice. European music, wholly built on instrumental forms, again appears only one among radically distinct varieties of the art of tone.

Hitherto Europeans have believed all this alien music to be rude, primitive and nugatory—an assumption of which the present inquiries amply show the naïveté. The extraordinary exactness of ear and voice revealed in the phonographic records of some Pueblo songs is matched by the achievements of Siamese musicians in tuning their instruments, as tested by Professor Stumpf. They proved able to approximate more closely to their isotonic scale than our piano tuners commonly do to the European octave. The absolute pitch of panpipes from Melanesia proved so closely

identical with that of others from Java as to suggest an ethnic or historical affinity between their makers. This close identity between instruments of distant countries, discovered after an interval of years, bears strong testimony at once to native skill and to the accuracy of the methods employed in these studies and to the competence of the students.

To much non-European music the word primitive is wholly inapplicable. An immense development has led up to the isotonic octave. The choice of seven steps is referred by Professor Stumpf to mystic ideas of number; but he also suggests that a diatonic scale, the result of tuning by a chain of fourths, may have preceded the Siamese order. If so, the European scale, which still approximates such a tuning, is the less developed of the two. That of eastern Asia is a modification too radical to have completed itself in less than ages of progress.

Besides its frequent high refinement and artificiality, non-European music has an artistic rank of which it is hard for us to convince ourselves. Rank to its makers, be it added at once; and herein lies the widest lesson of the whole inquiry. This may be described in a phrase as the discovery of how great a part is played by the mind in apprehending a work of art; and how little of the veritable creation can often be grasped by an alien. Professor Stumpf cites a striking example. Since c-e-g on our instruments is a major chord and e-g-b a minor, the two sound to us major and minor, respectively, on a Siamese xylophone, where they are, nevertheless, identical combinations. In like manner a comparison of the tone-material in phonographic records with the same melodies heard currently makes it apparent that Europeans apprehend all music in the diatonic terms familiar to their ears. From the first employment of the instrument doubt began to be thrown on the earlier notations by ear which exhibited exotic music generally as a poor relation of the European family. Psychologically, the value of these results as a notable instance of the dependence of sense on fancy is very great. As a discipline in liberal culture compelling us to seek for the standpoint

of other minds, they will be invaluable to all privileged to follow them. It is our own ears that are oftenest at fault when we hear in exotic music only a strident monotony or a dismal uproar to be avoided and forgotten. To most non-Europeans their music is as passionate and sacred as ours to us and among many it is an equally elaborate and all-pervading art.

The influence of European music becomes every day more audible in the singing and playing of non-European peoples. The time seems not far off when the task of dissecting out aboriginal elements will become impossible. As the ornament in Queen Ti's tomb fell to dust at the entry of the explorer, so exotic music is already dying on the ears of its discoverers. The life of the science has inexorable limits, and if it is to yield what it might, the number of those who pursue it and the money at their command must at once be greatly increased. The results of a few years' work by a few students sufficiently show the absorbing interest and the wide-reaching value of the study; and should bring out both material and personal aid in plenty from lovers of music, of ethnology and of the humanities. What men of means or of science will offer their fortunes or themselves for this imperative labor?

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THE RELATIONSHIPS OF THE ESKIMOS OF EAST GREENLAND

DR. W. THALBITZER describes in the "*Meddelelser om Grønland*," Vol. XXVIII., the Amdrup collection from east Greenland, which comprises objects found between the sixty-eighth and seventy-fifth degrees of north latitude. The publication is of great interest, because it brings out conclusively the close relationship between the culture of the northeast coast of Greenland and that of Ellesmere Land, northern Baffin Land and the northwestern part of Hudson Bay. The similarities are so far-reaching that I do not hesitate to express the opinion that the line of migration and cultural connection between northeast Greenland and the more southwest-

erly regions must have followed the shores of Ellesmere Land, the northern coast of Greenland, and then southward along the east coast. One of most suggestive types found in Dr. Thalbitzer's publication is the needle-case figured on page 421. I have called attention to the distribution of this type of needle-case in my paper on the "Eskimo of Baffin Land and Hudson Bay,"¹ and in a discussion of the decorative designs of Alaskan needle-cases.² The specimens described in these two publications are from Frozen Strait in Hudson Bay, Ponds Bay and Smith Sound. Later on I published another needle-case of the same type from Rawlings Bay in Ellesmere Land. Among these specimens only those from Ponds Bay and Smith Sound are found in actual use, while the others were collected from ancient house-sites. Two similar specimens are figured by Dr. Thalbitzer (p. 527). These were found in the region of northwestern Greenland, that is, near the island of Disco. It is important to note that the ornamentation on the large specimen here figured is identical with the alternating spur decoration which was discussed by Stolpe in his studies of American ornament, and by myself in the discussion of Alaskan needle-cases before referred to. The same ornament occurs in the ornamentation of a comb shown on page 472 of Dr. Thalbitzer's publication.

Among the other specimens, sealing-stools (pp. 430, 431) seem to be particularly important. They are very similar in form to a specimen found by Peary in Grinnell Land.³ The ice-scraper of bone figured on page 438 must be compared with the set of implements shown on page 409, "Eskimo of Baffin Land and Hudson Bay." Even the perforation for suspending the scraper agrees with those of specimens from Southampton Island. There seems to me little doubt that the hammer-like implement illustrated on page 442 of Dr. Thalbitzer's publication is a blubber-pounder

¹ *Bulletin American Museum of Natural History*, Vol. XV., part 2, p. 433.

² *Proceedings of the U. S. National Museum*, Vol. XXXIV., p. 326.

³ "Eskimo of Baffin Land and Hudson Bay," p. 463.

similar to those made of musk-ox horn illustrated on page 402 of my paper on the "Eskimo of Baffin Land." The bone heads of adzes⁴ agree fairly well with those shown on page 381.⁵ The decoration on the handles of the bodkins⁶ may perhaps be compared to the handles of the wick-trimmers from Melville Peninsula.⁷

All these types which show close correspondence in form are so much specialized that they must be considered as evidence of old contact or of sameness of origin. So far as I am aware, none of these types have been found in the region between Disco and Cape Farewell, nor do they occur in Angmagsalik. If this is true, the conclusion seems unavoidable that the Eskimos reached the northeast coast of Greenland by way of the north coast.

C. Ryder has called attention to the similarity of some of the east Greenland types to those from Alaska, and Thalbitzer again calls attention to the similarity of the harpoon-shafts to those of Point Barrow (p. 444). I have called attention to several other similarities of this kind, particularly the alternating spur decoration, to which Thalbitzer also refers (p. 472), and the forms of several specimens.⁸ Similarities between the Ponds Bay region and the western regions have also been pointed out by Dr. Wissler in his description of a collection made by Capt. Mutch at my instance in that region.⁹ The distribution of types suggests very strongly that a line of migration or of cultural contact may have extended from the Mackenzie region northeastward over the Arctic Archipelago to north Greenland, passing over the most northerly part of Baffin Land, and that the culture of southwestern Greenland, and that of southeastern Baffin Land and of Labrador, must be considered as specialized types.

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⁴ Thalbitzer, p. 449.

⁵ Boas; compare also *ibid.*, p. 416.

⁶ Thalbitzer, p. 399.

⁷ Boas, p. 403.

⁸ Boas, pp. 461-464.

⁹ *Anthropological Papers of the American Museum of Natural History*, Vol. II., Part III., pp. 316-318.